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This manual guides Navy areas in developing and implementing their Spill Prevention, Control, and Countermeasure plan (SPCC Plan) for oil and hazardous substances (HS). This document is required by the Environmental Protection Agency (EPA) Part 40 of the Code of Federal Regulation, Section 112 (20 CFR 112), the Oil Pollution Prevention regulation, and OPNAVINST 5090.1B, for oil area meeting the criteria in 40 CFR 112. Spill control measures are required for hazardous waste (HW) storage areas regulated by either 40 CFR 264 or 40 CFR 265.. Additionally, some spill control measures are required for underground storage tanks (UST) regulated by 40 CFR 280. HW storage areas, not specifically regulated by the above referenced regulations, do not have regulated spill control requirements; however, it is considered best engineering practice to have spill control measures at all HS storage areas. Therefore, it is recommended that all HS storage areas be included in Navy SPCC plans. For overseas locations please refer to OEBGD/FGS criteria for spill prevention guidance.

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CHAPTER 1

INTRODUCTION

1.1. PURPOSE

This manual guides Navy areas in developing and implementing their Spill Prevention, Control, and Countermeasure Plan (SPCC Plan) for oil and hazardous substances (HS). This document is required by the Environmental Protection Agency (EPA) Part 40 of the Code of Federal Regulation, Section 112 (40 CFR 112), the Oil Pollution Prevention regulation, and OPNAVINST 5090.1B, for oil areas meeting the criteria in 40 CFR 112. Spill control measures are required for hazardous waste (HW) storage areas regulated by either 40 CFR 264 or 40 CFR 265. Additionally, some spill control measures are required for underground storage tanks (USTs) regulated by 40 CFR 280. HS storage areas, not specifically regulated by the above referenced regulations, do not have regulated spill control requirements; however, it is considered best engineering practice to have spill control measures at all HS storage areas. Therefore, it is recommended that all HS storage areas be included in Navy SPCC plans. For overseas locations please refer to OEBGD/FGS criteria for spill prevention guidance.

The SPCC requirements are intended to minimize an area's potential for an oil or HS spill, to prevent any oil or HS spill from leaving the confines of the area, and to ensure that the cause of any spill is corrected. These goals are accomplished by requiring compliance to specific design standards for oil and HS storage, standard operating procedures, inspections, testing, construction of containment structures, personnel training, and placement of equipment at the area.

This manual guides the user through the planning process, from assessing areas, to collecting and organizing the information that goes into the plan, to preparing and implementing the plan. This manual also helps the user determine to which areas the various regulations apply, identify physical and procedural deficiencies, and propose corrective actions.

A SPCC Plan for oil and HS template document has been prepared to complement this manual. The template document has the basic format and information required for a SPCC plan. The user completes the document by surveying the area and inputting the required information and descriptions into the template document. The majority of

the information is formatted in table form for ease of use. The template document is available in Microsoft Word® version 97 format.

1.2. WHY PLAN?

Navy areas use, store, treat, process, and transport large quantities of oil and HS in support of their mission. These substances are at a constant risk of being spilled into the environment due to accidents, equipment failure, operator error, and other unscheduled events. To insure mission readiness, the Navy is concerned with the proper and efficient operation of its areas. Navy resources are impacted whenever oil and HS spills occur.

Oil and HS spill prevention is currently regulated under several Federal laws and regulations, especially those dealing with oil, HW, Polychlorinated Biphenyls (PCBs), and NPDES permitted areas under the Clean Water Act (CWA). State and local agencies may also have regulatory requirements which must be met and addressed in the SPCC plan.

Implementing adequate provisions such as dikes and curbing reduces the impact of a potential spill. The cost of planning is small when compared to the potential cleanup costs, worker injuries, public health and environmental impacts, production downtime, expensive fines and lengthy litigation, as well as the poor public image that a large spill creates.

1.3. LEGAL AND NAVY REQUIREMENTS

The CWA required the EPA to promulgate regulations to protect the surface waters of the United States. Consequently, in 1973 the EPA published 40 CFR 112, requiring applicable oil areas to develop and implement an SPCC plan. Since then, this CFR has been amended several times between 1973 and March of 1996. The Chief of Naval Operations (CNO), through the Environmental and Natural Resources Protection Manual (OPNAVINST 5090.1), directs applicable Navy areas to conform with 40 CFR 112 by developing and implementing SPCC plans. OPNAVINST 5090.1 states that Commanding Officers at Naval shore activities are responsible for budgeting, funding, and implementing hazardous material (which includes HS) spill prevention plans. The combination of these requirements is the SPCC Plan for oil and/or HS. For overseas locations please refer to OEBGD/FGS criteria for spill prevention guidance. Oil Pollution Act (OPA) and Non-OPA guidance is addressed in a separate guidance document.

40 CFR 112 requires that SPCC Plans be prepared for facilities which have the following storage capacities:

1) USTs with a capacity of more than 42,000 gallons of oil (40 CFR 112.1 (d)(2)(i)); or
2) Total aboveground storage tank (AST) capacity of greater than 1,320 gallons of oil (40 CFR 112.1 (d)(2)(ii)); or

3) At least one AST with a capacity greater than 660 gallons (40 CFR 112.1 (d)(2)(ii)).

These capacities can be reached by a single tank or multiple tanks in order for SPCC to apply. The minimum size container that should be included in a SPCC is 55 gallons, however, smaller quantities should also be included if they are a threat to waterways. There are many different functions and types of tanks such as oil tanks, hazardous waste tanks, day tanks, permanent storage tanks, single and double walled tanks, and process tanks, but it is beyond the scope of this guidance manual to cover in detail all the different possibilities. It is only important to realize the above definition of a regulated tank and to use the Navy definition of SPCC tanks as stated above for best management practices.

In addition to 40 CFR 112, other pertinent regulations such as those for USTs should be applied when evaluating oil and HS storage areas. The EPA regulates non-transportation related oil areas under 40 CFR 112, while the U.S. Department of Transportation regulates marine transportation related oil areas under 33 CFR 154 and 33 CFR 156, oil pipelines under 49 CFR 194, and hazardous liquid pipelines under 49 CFR 195.

All USTs must be included in the SPCC once the thresholds have been reached.

Section 2.6 of this guidance manual lists additional regulations. The following is a summary of notable regulations.

- 40 CFR 125, Subpart K, provides the criteria and standards for best management practices (BMP) for ancillary industrial activities subject to permitting requirements under the CWA. This applies to dischargers who use, manufacture, store, handle, or discharge any pollutant listed as toxic or hazardous under the CWA.
- 40 CFR 264 and 40 CFR 265 set standards for owners and operators of HW treatment, storage, and disposal areas.
- 40 CFR 280 addresses technical standards and corrective action requirements for owners and operators of USTs. This regulation impacts USTs, partially-buried storage tanks, and bunkered storage tanks whose volume, including attached underground piping, is at least 10 percent beneath the surface of the ground and contains either petroleum oil or Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)-regulated substances excluding regulated HW.
- 40 CFR 761 establishes requirements for the manufacture, processing, distribution, disposal, and storage of PCBs. This regulation addresses such topics as containment, maintenance, inspection, security, etc.

1.4. DIFFERENCES BETWEEN SPCC AND CONTINGENCY PLANNING

Though they may be easily confused for one another and may contain some of the same material, SPCC plans and contingency plans are two distinct, separate plans with different purposes and different laws and regulations behind them.

SPCC plans are required by 40 CFR 112 and OPNAVINST 5090.1B. An SPCC plan defines what measures are being taken at oil and HS areas to prevent spills. An SPCC plan documents spill prevention structures, procedures, and equipment that are already in place, and recommends any additional spill containment structures, procedures, and equipment that should be in place. SPCC plans at areas handling oil must be certified by a registered professional engineer.

Contingency plans are required by 40 CFR 300, which is authorized by CERCLA. Contingency plans call for pre-planning the response to and cleanup of a spill that has actually occurred. Contingency plans detail how personnel will respond to a spill that has already occurred. This is the major difference: SPCC plans address spill prevention, while contingency plans address spill response. Additionally, contingency plans are not required to be certified by a registered professional engineer.

1.5. SCOPE

This SPCC Guidance Manual provides guidance for spill prevention planning at oil and HS areas. It is directed towards area environmental coordinators and engineering field division environmental engineers who develop or recertify SPCC plans for their areas.

This manual is intended to supplement, not replace, other technical references, manufacturer's material, and professional experts. It is not a design manual; the technical guidance is directed towards upgrading existing areas rather than designing new areas.

This manual deals specifically with HS listed in 40 CFR 302 under CERCLA, HW as defined in 40 CFR 261, and oil, fuels, and petroleum products as defined in 40 CFR 112. This manual does not address natural gas, natural gas liquids, liquefied natural gas, and synthetic gas usable for fuel. Liquefied natural gas areas are regulated under the Natural Gas Pipeline Safety Act of 1968. Spill prevention requirements under this act are covered in 49 CFR 193. Also, pipeline areas used to transport hazardous liquids are regulated under the Hazardous Liquid Pipeline Safety Act of 1979. The safety standards of this act are prescribed in 49 CFR 195.

Other Navy chemicals not addressed in this manual include ordnance, explosives, chemical/biological warfare agents, and radioactive materials, as these are covered under separate programs. For information on these programs, consult your regional Engineering Field Division (EFD).

This manual does not address state or local spill prevention rules, regulations, and guidelines. You should consult your EFD for information concerning these requirements.

1.6. ORGANIZATION OF THIS MANUAL

This manual is divided into ten chapters:

Chapter 1 introduces the SPCC Guidance Manual and the regulatory requirements for preparation of a SPCC Plan.

Chapter 2 outlines the steps to follow in preparing a SPCC Plan for your area and provides guidance in surveying your areas, compiling information, and finalizing your SPCC Plan.

Chapter 3 discusses oil and HS use in the Navy: the types of oil and HS used, typical causes of spills, and the many impacts of spills.

Chapter 4 provides the specific SPCC requirements for oil and HS storage. This includes corrosion protection, secondary containment, level-sensing devices, and testing.

Chapter 5 outlines the requirements for transfer systems including piping and couplings, overfill protection, system testing, and operations.

Chapter 6 explains how to predict the path of spills.

Chapter 7 discusses spill containment structures such as dikes, berms, catchment basins, curbing, and sorbents.

Chapter 8 provides guidance on drainage control and treatment units.

Chapter 9 discusses the necessary site security for spill prevention and reporting.

Chapter 10 outlines the administrative procedures under SPCC.

Nine appendices provide information referenced throughout the manual:

Appendix A - Acronyms and glossary

Appendix B – Operational requirements of SPCC rule

Appendix C - Data collection worksheets for developing an SPCC Plan

Appendix D - Inspection forms and procedures

Appendix E - A compatibility matrix between specific chemicals and a variety of construction materials

Appendix F - Standard operating procedures for loading/unloading operations

Appendix G - A list of spill control equipment vendors

Appendix H - A sample oil spill prevention, control, and countermeasure plan

Appendix I - A tank management plan

Appendix J - An April 29, 1992, EPA memorandum concerning alternative secondary containment

Appendix K - A spill prevention training syllabus and outline presentation

CHAPTER 2

SPCC PLAN DEVELOPMENT

2.1 INTRODUCTION

A Spill Prevention, Control and Countermeasure (SPCC) plan for oil and hazardous substances (HS) describes the procedures, methods, and equipment used at a facility's oil and/or HS areas to prevent or minimize the occurrence and impact of an oil or HS release. A SPCC plan is required for oil areas identified in Section 2.4. Spill control measures are required for certain other areas as discussed in Section 2.6. A SPCC plan is recommended for all hazardous substance areas as a best engineering practice. Developing and implementing a SPCC plan consists of five major steps:

- Identifying oil and HS present, potential spill sites, potential impact sites, and applicable areas.
- Evaluating areas for compliance with SPCC requirements.
- Preparing the SPCC plan using the results of the field surveys with recommended procedures and corrective actions. The SPCC plan may be completed on a facility level, addressing several areas, or for a single area.
- Implementing the SPCC plan's recommendations and procedures
- Reviewing the SPCC plan's effectiveness.

A SPCC Plan for oil and HS template document has been prepared to complement this manual. The template document has the basic format and information required for a SPCC plan. The user completes the document by surveying the area and inputting the required information and descriptions into the template document. The majority of the information is formatted in table form for ease of use. The template document is available in Microsoft Word® version 97 format.

This chapter will take the user through each step of the planning process.

2.2 SPCC RESPONSIBILITIES

The responsibility for developing and implementing the SPCC plan must be clearly established from the start. A Spill Control Committee (SCC) should be formed and tasked with this responsibility. The SCC should include representatives from Public Works, Engineering, Maintenance, Environmental, Safety, Supply, and Fire Department. The SCC functions similar to a fire prevention or safety committee. The

SCC's duties and responsibilities may include:

- Identify potential spill sources and oil and HS handled (materials inventory).
- Identify and correct spill prevention deficiencies.
- Establish spill reporting procedures.
- Establish visual inspection and records procedures.
- Review past incidents, countermeasures used, and lessons learned.
- Coordinate with the base spill contingency plan.
- Establish personnel training and education program.
- Review new construction and process changes at an area relative to spill prevention.
- Review, evaluate, and amend the spill prevention plan as required and institute appropriate changes at regular meetings.
- Coordinate all activities and organizations involved in implementing the plan.

The SPCC plan should delegate certain responsibilities to key personnel at the area. The following personnel are suggestions as to the appropriate personnel to assign SPCC responsibilities; evaluate the capabilities of people at your area when deciding who will be involved in the SCC and implementation of the SPCC plan. Personnel crucial to the successful implementation of an area's SPCC plan includes

- The Commanding Officer who is responsible for implementing the plan and budgeting and funding of SPCC projects;
- The Resident Officer in Charge of Construction (ROICC) or Public Works officer in charge of implementing SPCC construction projects;
- Area personnel, Public Works maintenance personnel, or Supply Fuel Department personnel are tasked with regular area inspections and preventive maintenance;
- A representative from the transportation office and a representative from the fire department;
- A representative from the safety office may be involved in employee training;
- The Security Office may be involved with after-hours area security inspections; and
- A representative from Public Works or Environmental Management may act as the area's regulatory contact and may keep pertinent SPCC records.

Whether your plan is developed by an outside consultant or in-house, the SCC must be proactive in performing these responsibilities. A registered professional engineer must certify the SPCC if the plan addresses any oil handling areas (40 CFR 112.3(d)).

2.3 RELEVANT INFORMATION AND RECORDS

2.3.1 General Area Information

A thorough familiarity with your area's mission, operation, and environmental setting is essential before preparing the SPCC plan. The nature of an area's operations, geography, and geology of the surrounding area affect the nature and extent of spill controls and countermeasures that may be required. The following information should be reviewed before starting the planning effort:

- Name and any alternative names for the area. This should include any identification including building number.
- Operator of the area, i.e. activity, department, tenant, command, etc.
- Area Operations; brief description of what the area does.
- Description of the area's physical plant.
- Designated Person; person who is accountable for spill prevention and who reports to line management
- Base master plan and organizational chart/manual.
- Base development and topographical maps.
- Location of area within host facility, e.g. map grid.
- Groundwater hydrology and soil permeability data.
- Base sanitary and storm sewer systems network.
- Existing or previous oil, hazardous substance, and hazardous waste (HW) related plans/studies.
- Past oil or HS spill records.
- Presence of environmentally sensitive areas including water bodies, parks lands, wildlife refuge areas, and similarly protected areas.
- Base chemical inventories (Supply and Base Environmental records).
- Base Fire Department inspection records for oil and HS storage areas.
- Compliance obligation (mandatory or optional) as determined by comparing the area storage equipment with the regulatory requirements described in Section 2.4 of this manual.

Even if a contractor prepares your SPCC plan, you should collect this information to ensure that you understand the current conditions. In addition, the information will be readily available for use by the contractor, which may reduce the cost of the plan.

2.4 DETERMINATION OF SPCC PLAN REQUIREMENTS

2.4.1 Facility

EPA verbally defines "facility" as fenceline to fenceline on a Naval Base for SPCC applicability and not individual facilities (i.e. fuel farms, bulk storage, gas stations, and etc.) within the Naval Base. However, many naval bases have other facilities within the base. They are also referred to as facilities. The terminology may be confusing. To clarify what is applicable to the threshold, the definition, a facility can be any container of oil which could reach navigable waters within the confines of the Naval Base, needs to be evaluated. Even though the individual facilities within the base facility do not meet the threshold requirements, all of the containers of oil collectively need to be considered. Once the requirement of a SPCC Plan is determined, the individual facilities within a base will be referred to as an "area." An area can be a fuel farm (a collection of tanks), an emergency generator (one or more tanks), or a used oil tank (typically one tank). There can be multiple oil storage containers within an "area." For example, the fuel farm facility will now be called a fuel farm "area" with multiple tanks.

An activity could optionally split their base into multiple facilities, but this must be coordinated through their Regional Environmental Coordinators (REC) and local regulators.

There is a large variety of types of SPCC areas, and most have only a few medium to small size tanks or distribution points. Sources of spills at end use areas include overfilling tanks, leaking tanks, and drum leaks and spills. Many of these areas have waste oil tanks, for collection and temporary storage of waste oil, which are below the size limit which requires an SPCC plan. However, since small spills frequently occur at waste oil tanks due to improper housekeeping practices, waste oil tanks deserve consideration as a SPCC facility.

2.4.2 Applicability under 40 CFR 112 (Oil Regulation)

An area must be included in the SPCC plan when the area meets certain criteria concerning the transportation classification, storage capacity, and potential for discharge. If either of the following sections is applicable, a SPCC plan is required.

2.4.2.1 Probability of Reaching Navigable Waters 112.1(d)(1)(A)

If an area can reasonably be expected to discharge oil into or upon a navigable waterway or shoreline of the United States or meets the size requirement shown in Section 2.4.2.3 of this manual, then the area needs an SPCC plan. A waterway need not be navigable at the location where oil would enter the waterway for it to be considered navigable. The term "navigable waterways" includes not only the traditionally recognized navigable waters, but all streams, creeks, lakes, and ponds which are used recreationally or commercially and tributary systems connected to these bodies of water.

Naval activities that are inland may or may not have the potential to discharge to a

U.S. waterway. Although an oil area may be far from a navigable waterway, if drainage from the area could reach a navigable waterway through surface or groundwater migration, the area must be included in a SPCC plan. This means that a spill at any site may have the potential to reach a navigable waterway. You will need to consult topographic maps of your activity and surroundings to determine or predict the final destination of your activity drainage. Is your activity in a basin that feeds streams or tributaries to a navigable waterway? If so, it is reasonable that drainage from your activity could ultimately flow to navigable waters.

The probability of spills reaching navigable waters or its shores must be determined without consideration of spill control or other man-made structures. Man-made features such as dikes, equipment, or other structures that may serve to contain or prevent an oil discharge from reaching a navigable waterway cannot be considered. If the contours of the landscape can retain the potential spill volume, then there is a low potential of the spill reaching navigable waters. If navigable waters or a storm drain discharging to navigable waters is adjacent to the storage area, then there is a high potential of the spill reaching navigable waters. If navigable waters are not adjacent to the storage area but the terrain cannot retain the potential spill volume then there is a medium potential of the spill reaching navigable waters.

Table 2-1 lists potential spill hazards at various types of oil areas. The table also gives the relative probability of a spill from different types of equipment at an area and the possible severity of a spill from the site.

2.4.2.2 Transportation Classification 112.1(a)

The EPA regulates non-transportation-related oil areas under 40 CFR 112, while the U.S. Department of Transportation (DOT) regulates transportation-related oil areas under 33 CFR 154 and 33 CFR 156, oil pipelines under 49 CFR 194, and hazardous liquid pipelines under 49 CFR 195. EPA's SPCC regulations, 40 CFR 112, require non-transportation-related oil areas meeting certain criteria to have SPCC plans.

The distinction between a transportation-related and a non-transportation-related area is defined in the Memorandum of Understanding, presented in Appendix A of 40 CFR 112, between the Secretary of Transportation and the Administrator of the Environmental Protection Agency. Appendix B of 40 CFR 112 states the agreement between the EPA, DOT, and the Department of Interior (DOI) as follows:

- EPA regulates non-transportation related offshore facilities located landward of the coast line
- DOT regulates transportation related facilities, including pipelines, located landward of the coast line and retains jurisdiction for deep-water ports and their associated pipelines
- DOI retains jurisdiction over facilities, including pipelines, located seaward of the coast line, except for deep-water ports and their associated pipelines

Tanker trucks that operate solely within the boundaries of an installation are

regulated as "portable tanks" by EPA under 40 CFR 112 (see 40 CFR 112, Appendix A, Section II, (1)(J)). 40 CFR 112 is presented in Appendix B of this document. Figure 2-1 illustrates the distinction between the two classifications.

2.4.2.3 Oil Storage Capacity 112.1

For the purpose of 40 CFR 112, oil storage occurs when an area is engaged in storing, transferring, distributing, or consuming oil. The associated piping of a storage tank is to be considered as part of the capacity. 40 CFR 112 defines specific storage capacity thresholds; when an area meets or exceeds one of the thresholds and could reasonably be capable of discharging oil in harmful quantities into navigable waters, the area must be included in an SPCC plan. The total storage capacity of the area must be considered, not just the typical or anticipated storage capacity.

An oil storage area, which could reasonably be capable of discharging oil in harmful quantities into navigable waters, requires an SPCC plan when the total storage capacity of the area meets or exceeds any of the following thresholds:

- The underground storage capacity of the area is greater than 42,000 gallons of oil, or
- The aboveground storage capacity of the area is greater than 1,320 gallons of oil, or
- The individual aboveground storage capacity of any one container or tank at the area is greater than 660 gallons of oil.

The minimum size container that should be included in an SPCC is 55 gallons, however, smaller quantities should also be included if they are a threat to waterways.

2.4.3 Applicability Under Various HS Regulations (OPTIONAL)

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) definition of a potential HS spill site includes any area, building, structure, equipment, pipe or pipeline, well, pit, pond, lagoon, landfill, ditch, container, vehicle, rolling stock, or aircraft, that could experience an HS spill or release of sufficient magnitude to require reporting it to the National Response Center.

A hazardous substance, or HS, is any substance, which because of its quantity, concentration, or physical/chemical characteristics, may pose a substantial hazard to human health or the environment, when spilled or released to the environment. The CERCLA definition of HS includes substances regulated under several laws including the Clean Water Act (CWA), Resource Conservation and Recovery Act (RCRA), Toxic Substances Control Act (TSCA) and the Clean Air Act (CAA). EPA has published a consolidated list of these substances in 40 CFR 302.4, along with a "reportable quantity" for each substance. The term, HS, does not include petroleum and petroleum products (including crude oil) which are not otherwise specifically listed in 40 CFR 302, nor does it include natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel.

Table 2-1
Areas of Potential Spill Hazards

	Tank Farms	Terminals	Airports	Power Plants	Industrial Plants	Drilling	Onshore Prod	Offshore Prod
Tanks								
Gauges	H/3	M/3			H/3		M/3	M/2
Sampling areas	H/3	H/3	M/3	M/3	H/3			
Shell and bottoms	L/1	L/1	L/1	L/1	L/1		L/1	L/1
Underground seepage	L/1	L/1	L/1	L/1	L/1			
Heating coils	M/2			M/1	L/2			
Containment dikes	M/2	M/2	M/2	M/2	M/2	M/3	L/2	
Dike drains	H/2			L/2	M/2		M/2	
Pipe, Valves, and Fittings								
Seal failure						L/1	L/1	L/1
Valve stem packing	M/3	M/3	M/3	M/3	H/2		M/2	M/2
Gaskets	M/2	H/3	M/3	M/3	H/2		M/2	M/2
Pipe rupture	L/1	L/1	L/1	L/1	L/2		L/1	L/1
Pumps and Mechanical Equipment								
Seals	M/2	M/3	M/3	M/2	H/2	H/3	H/1	H/2
Lubricating systems					H/2	H/3		H/2
Loading Stations								
Fill safeguards		L/1	L/1				H/2	
Curbs and drains		H/2	H/2				M/2	
Waste Disposal								
Oil sumps	M/2	M/3		M/2	M/2		H/2	H/2
Separators	M/2	M/3		M/2	M/2		M/1	H/2
Site drainage	H/1	L/2	M/2	L/2	H/2	H/2	M/2	
Pits						M/2	M/2	
OPERATIONS								
Tanks								
Filling/Overfilling	H/1	H/1	M/2	M/1	H/1	M/2	H/1	L/2
Sampling	H/2	M/3	M/3	M/3	H/2		H/3	L/3
Cleaning	H/1	L/2	L/2	L/2	M/1		H/2	L/2
Dike draining	H/2			L/2	M/2		H/2	
Pipe, Valves, and Fittings								
Maintenance		H/2	M/2	M/2	H/2	H/1	H/3	H/2
Collision		H/1	l/2		L/1		L/1	
Pumps								
Maintenance	H/3	H/3	H/3	H/3	H/2	H/2	H/3	H/2
Loading Racks								
Overfills		H/2	M/2				H/2	
Loading drips		H/3	H/3				H/3	
Waste Disposal								
Monitoring	H/2	M/3	M/3	M/3	M/2	M/2	H/2	H/2
Maintenance	M/1	L/2	L/3	L/3	L/2	H/2	L/2	L/1

Probability	Severity
H - High, occurs frequently	1 - Major cleanup required
M - Medium, could occur periodically	2 - Intermediate cleanup required
L - Low, could occur on less frequent occasions	3 - Minor cleanup required

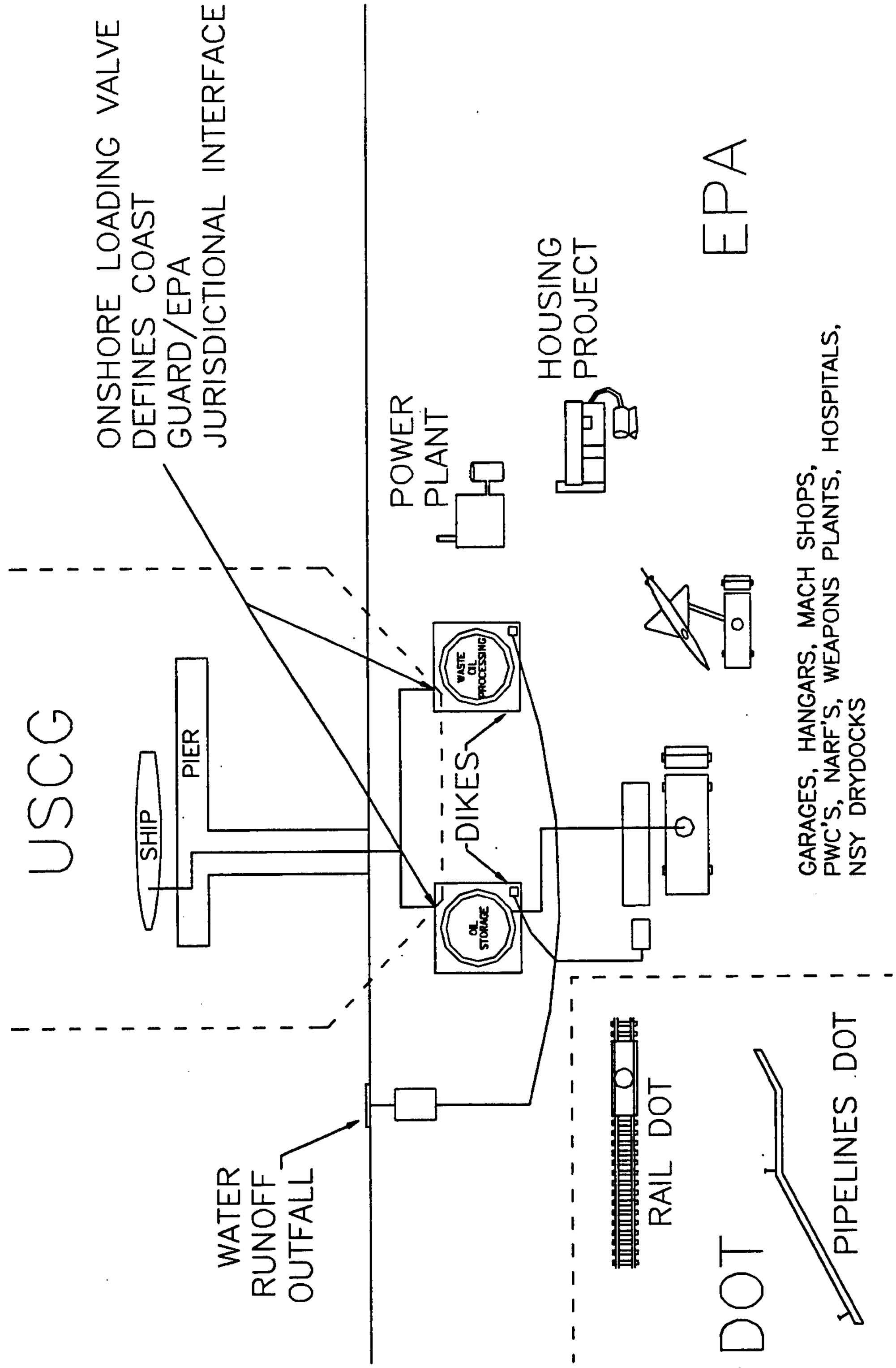


Figure 2-1
Boundaries of U.S. Coast Guard and EPA Jurisdiction

CERCLA also defines an HS "release," as any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or disposing of a regulated HS into the environment. All locations having the potential for releasing into the environment any of the regulated HS specified in 40 CFR 302.4 should be incorporated into the SPCC plan.

Navy areas and equipment which are subject to spill prevention requirements can be categorized as follows:

- Drums and smaller container storage and handling areas such as operation shops, raw material warehouses, HW storage areas, and satellite accumulation areas.
- Bulk storage (fixed and portable HS/HW storage tanks, bow-sets, process tanks and transfer tank car/truck loading and unloading areas, piping systems, pumps, etc.) areas.
- Spill control structures and drainage systems (containment areas, diversion channels and sewers, treatment ponds and lagoons, etc.).

When identifying potential spill sites using the above criteria, keep in mind that there are five types of releases that are exempted under CERCLA:

- Releases to the environment in compliance with Federal/State permits.
- The normal application of fertilizers.
- The normal application of registered insecticides, fungicides, herbicides, and rodenticides in accordance with recommended procedures.
- Emissions from engine exhaust on moving vehicles.
- Releases that do not enter the environment. This primarily includes indoor storage areas of small quantities of nongaseous substances, stored in such a way that spills cannot come in contact with the soil or enter a drain where they may be released into the environment.

The SPCC plan preparer should examine each site identified under the above groups for the potential risk of HS releases to the environment. An HS inventory should be developed for every area identified to determine the specific sources and quantities of HS handled at each particular site. The detail of each site's inventory should be proportionate to the quantity of HS present and their potential risk to the environment.

2.5 SPCC PLAN REQUIREMENTS

The primary motivation for developing a SPCC plan is to comply with Federal and Naval regulations. To satisfy the requirements of 40 CFR 112, your SPCC plan must address some general conditions.

2.5.1 Engineering Certification 112.3(d)

Unless the SPCC plan covers areas handling only HS, the SPCC plan must be

certified by a registered professional engineer (PE) who is familiar with the provisions of 40 CFR 112, has examined the area, and has reviewed the SPCC plan. The PE certifies that the SPCC plan has been prepared in accordance with good engineering practices. In addition, a registered PE must certify the plan every time the plan is amended.

2.5.2 Command Endorsement — 112.7

The plan is required to have full approval of management at the level that has the authority to commit all necessary resources. A written endorsement of the plan is required to be given by the Commanding Officer and the Public Works Officer. The SPCC plan should identify the specific deficiencies and corrective actions required so that management can commit the resources to eliminate SPCC deficiencies. The plan can be used to:

- Fund projects - the plan summarizes, prioritizes, and estimates costs of projects. The plan also provides logs to record the projects' implementation.
- Correct procedures - the plan provides written procedures for standard area operations.
- Assist in spill response - the plan provides maps, drawings, and spill prediction to assist response efforts. The SPCC plan is not a contingency plan, but can be a useful document to supplement the area's contingency plan during response.
- Identify training requirements - the plan identifies appropriate personnel training and incorporates site-specific responsibilities and procedures.

2.5.3 Plan Accessibility — 112.3(e)

40 CFR 112 requires that a complete copy of the SPCC plan be maintained at the area if the area is normally attended at least 8 hours per day or at the nearest field office if the area is not attended. The plan must be made available to the EPA Regional Administrator, or his representative, for on-site review during normal working hours.

The activity Environmental Coordinator should maintain a complete copy of the plan, as should each SPCC area at the facility.

However, if the plan is too large, each area should maintain a copy of the sections of the plan which are pertinent to the area. Pertinent sections include the facility instruction that implements the SPCC plan, general facility-wide procedures, operating procedures and instructions, and the specific evaluation of the area. In the SPCC template, this would include Sections 1 through 4 and the area-specific subsection from Section 5.

2.6 ADDITIONAL REGULATIONS

As stated in Section 1.2, OPNAVINST 5090.1 states that Navy activities must comply with all applicable laws and regulations including implementing SPCC plans

(OPNAVINST 5090.1, Section 9-4.2).

The areas categorized in Section 2.4 must comply with several existing Federal spill prevention regulations.

2.6.1 40 CFR 264 and 265 for RCRA HW Areas

40 CFR 264 and 40 CFR 265 are identical regulations; 40 CFR 265 is an interim status standard derived from 40 CFR 264. Both regulations cover hazardous waste treatment, storage, and disposal areas permitted under the Resources Conservation and Recovery Act (RCRA) and establish minimum national standards for the management of hazardous waste. Hazardous waste generators are required to manage hazardous waste in accordance with the storage standards in 40 CFR 265. Table 2-2 lists the topics pertinent to spill prevention planning and the regulations that apply.

Table 2-2
Selected Hazardous Waste Regulations

Topic	Regulation
Security	40 CFR 265.14 (required for TSD Facilities)
Inspection	40 CFR 265.15 (required for TSD Facilities)
Personnel Training	40 CFR 265.16 (required for TSD Facilities and HW Generators)
Safety Equipment	40 CFR 265.32 (required for TSD Facilities and HW Generators)
Preventative Maintenance	40 CFR 265.33 (required for TSD Facilities and HW Generators)
Record Keeping	40 CFR 265 Subpart E (required for TSD Facilities)
Container Storage	40 CFR 265 Subpart I (required for TSD Facilities and HW Generators)
Material Compatibility	40 CFR 265.172 (required for TSD Facilities and HW Generators)
Tanks	40 CFR 265 Subpart J (required for TSD Facilities and HW Generators)
Hazardous Waste Surface Impoundments	40 CFR 265 Subpart K (required for TSD Facilities and HW Generators)

2.6.2 40 CFR 125 Best Management Practices Requirements

Subpart K of 40 CFR 125 provides the criteria and standards for best management practices (BMP) for ancillary industrial activities subject to permitting requirements

under the Clean Water Act (NPDES permits). This applies to dischargers who use, manufacture, store, handle, or discharge any pollutant listed as toxic or hazardous under the Clean Water Act. 40 CFR 125 applies to storage areas, in-plant transfer, process and material handling areas, loading and unloading operations, plant site runoff, and sludge and waste disposal areas.

The BMP program address the following points:

- Statement of Policy
- Spill Control Committee
- Material Inventory
- Material Compatibility
- Employee Training
- Reporting and Notification
- Visual Inspections
- Preventive Maintenance
- Housekeeping
- Security

In order to comply with stormwater BMPs, many Navy activities have developed Storm Water Pollution Prevention Plans (SWPPPs). Spill prevention is generally a component of a SWPPP. To the extent possible, activities should attempt to avoid duplication between their SWPPP and SPCC plans. If HS storage area spill prevention is already adequately addressed by an activity's SWPPP, then these areas should not be included in the SPCC plan. For oil storage areas, the EPA allows the SPCC plan to be incorporated by reference into the SWPPP's written stormwater BMPs (40 CFR 125.104(b)(4)). At a minimum, there must be consistency between the SWPPP and SPCC plans; otherwise, it will be difficult for an activity to comply with both plans. The EPA developed the NPDES Best Management Practices Guidance Document, PB80-135221, to assist permitting authorities and permit applicants to comply with the BMP requirements. State and local requirements are not addressed in this manual, but must be met where they exist.

2.6.3 40 CFR 761 Polychorinated Biphenyls (PCBs)

40 CFR 761 establishes requirements for the manufacture, processing, distribution, disposal, and storage of polychlorinated biphenyls (PCBs). 40 CFR 761.65 covers PCB spill prevention and applies to the storage for disposal of PCBs at concentrations of 50 ppm or greater. 40 CFR 761.65 also provides criteria for storage containers, PCB transformers, and inspection for leaks. The following criteria for a PCB storage area must be met:

- Adequate roof and walls to prevent rain water from reaching the stored PCB.
- An adequate floor with a minimum 6-inch high continuous curb. The floor and curbing must provide a containment volume equal to at least two times the internal volume of the largest PCB container or 25 percent of the total internal volume of all PCB container stored, whichever is greater.
- NO drain valves, floor drains, or other openings that permit liquids to flow from the curbed area.
- Floors and curbing must be constructed of continuous smooth and impervious material to prevent or minimize PCB penetration.
- Not located below the 100-year flood water elevation.

2.6.4 40 CFR 280 Underground Storage Tanks

40 CFR 280 establishes requirements for underground storage tanks. This regulation regulates underground storage tanks, partially-buried storage tanks, and bunkered storage tanks whose volume, including attached underground piping, is at least 10 percent beneath the surface of the ground and contains either petroleum oil or a CERCLA-regulated substance excluding regulated hazardous wastes. 40 CFR 280 does not regulate any of the following:

- Farm or residential tank of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes;
- Tank used for storing heating oil for consumptive use on the premises where stored (covered by SPCC);
- Septic tank;
- Pipeline facility (including gathering lines) regulated under (covered by SPCC): The Natural Gas Pipeline Safety Act of 1968, The Hazardous Liquid Pipeline Safety Act of 1979, or Which is an intrastate pipeline facility regulated under state laws comparable to the provisions of the law referred to under this bullet;
- Surface impoundment, pit, pond, or lagoon;
- Stormwater or wastewater collection system;
- Flow-through process tank (covered by SPCC);

- Liquid trap or associated gathering lines directly related to oil or gas production and gathering operations (covered by SPCC); or
- Storage tank situated in an underground area (such as a basement, cellar, mineworking, drift, shaft, or tunnel) if the storage tank is situated upon or above the surface of the floor (covered by SPCC).
- Any UST system holding hazardous wastes listed or identified under Subtitle C of the Solid Waste Disposal Act, or a mixture of such hazardous waste and other regulated substances;
- Any wastewater treatment tank system that is part of a wastewater treatment facility regulated under section 402 or 307(b) of the Clean Water Act;
- Equipment or machinery that contains regulated substances for operational purposes such as hydraulic lift tanks and electrical equipment tanks;
- Any UST system whose capacity is 110 gallons or less;
- Any UST system that contains a *de minimis* concentration of regulated substances;
- Any emergency spill or overflow containment UST system that is expeditiously emptied after use.

The following deferrals under 40 CFR 280 are regulated for Release Response and Corrective Action outlined in Subpart F:

- Wastewater treatment tank systems;
- Any UST systems containing radioactive material that are regulated under the Atomic Energy Act of 1954;
- Any UST system that is part of an emergency generator system at nuclear power generation facilities regulated by the Nuclear Regulatory Commission under 10 CFR Part 50, Appendix A;
- Airport hydrant fuel distribution systems (covered by SPCC); and
- UST systems with field-constructed tanks (covered by SPCC).

Release Detection outlined in Subpart D of 40 CFR 280 does not apply to any UST system that stores fuel solely for use by emergency power generators, but such a system is covered in SPCC.

Given here are some of the highlights of 40 CFR 280. For a full detail description of the requirements stated in 40 CFR 280, consult the corresponding sections of 40 CFR 280 as listed below:

- The tank is to be constructed of fiberglass-reinforced plastic, steel fiberglass-reinforced plastic composite, or steel which is protected from corrosion using a suitable dielectric coating, an impressed current system, or a suitable cathodic protection system (40 CFR 280.20).

- UST systems must be made of or lined with materials that are compatible with the substance stored in the UST system (40 CFR 280.32).
- Piping routinely containing regulated substances and in contact with the ground must be properly designed, constructed, and protected from corrosion (40 CFR 280.20).
- Underground steel piping must also be protected from corrosion using a suitable dielectric coating, an impressed current system, or a suitable cathodic protection system. Cathodic protection systems must be inspected in accordance with 40 CFR 280.31.
- Petroleum UST systems must have release detection for tanks (40 CFR 280.41(a)) and for piping (40CFR280.41(b)).
- Methods of release detection for tanks such as inventory control, manual tank gauging, tank tightness testing, automatic tank gauging, vapor monitoring, groundwater monitoring, and interstitial monitoring are required (40 CFR 280.43).
- Regulated tanks must have a spill catchment basin or other suitable device to prevent release when the transfer hose is disconnected from the fill pipe (40 CFR 280.20(c)).

Owners and operators must cooperate fully with inspections, monitoring, and testing conducted by the implementing agency, as well as requests for document submission, testing, and monitoring (40 CFR 280.34). Tanks are also required to have overfill protection such as automatic flow shut off devices, high-level flow restrictors, or high-level alarms. The operator must ensure that the volume available in the tank is greater than the volume of product to be transferred to the tank before the transfer is made and that the transfer operation is monitored constantly to prevent overfilling and spilling.

- New tanks are required to have a release detection system which can detect a release from any part of the tank and associated piping (40 CFR 280.40).
- Hazardous substance UST's are required to have secondary containment for the tank and associated underground piping (40 CFR 280.42).

The UST must be installed by a certified installer, be inspected by a registered professional engineer or implementing agency, or installed according to a manufacturer's checklist.

Existing regulated tanks must be upgraded no later than December 22, 1998, to the new UST system performance standards under 40 CFR 280.20 or to the upgrade standards in 40 CFR 280.21.

2.7 AREA EVALUATION

Once all potential spill sites are identified, each site must be evaluated for compliance with applicable requirements. The remaining chapters and appendices in this manual are devoted to assist in evaluating and identifying common spill prevention deficiencies and determining corrective actions for the various types of oil and HS areas defined in Section 2.4. This section describes how to evaluate these areas as the first step to prepare your plan.

2.7.1 Field Survey

A field survey must be done to identify deficiencies and inconsistencies with the SPCC requirements. In addition, corrective actions and an implementation schedule must be proposed to remedy these deficiencies.

When collecting data, it is not enough to say, "the dike area is impervious to oil." Saying, "the dike area is lined with a clay barrier and is impervious to oil" is a preferable statement. In addition, the source of supporting data should be identified, such as design drawings, field measurements, and personal interview. The field survey should be conducted using data collection worksheets (Appendix D) for identifying and organizing the required information.

2.7.2 Data Collection Worksheets

Appendix D contains data collection worksheets for each type of oil or HS area or operation to be included in the plan. Each site should be given a detailed inspection, using the data collection worksheets to collect, organize, and evaluate the site's relevant information. Key points of contact at each site should be interviewed to clarify unclear information.

There are several different data collection worksheets, each pertaining to a particular area category as described in Section 2.4. Each part contains checklists and fill-in boxes to examine the area for compliance with applicable requirements.

Particular attention should be given during these audits to defining accurate probable spill routes for all potential spill sources at each site. This can be as detailed as practical, and can include references to drainage maps, drawings, or pictures. The potential impacts to the environment, particularly navigable waters, natural resources, soil, and groundwater, should also be assessed at this time.

2.7.3 Identification of Deficiencies and Corrective Actions

After completing the field audits, the information collected should be evaluated with respect to applicable requirements and assessed to determine the relative risks of the deficiencies found. The subsequent chapters of this manual address common deficiencies associated with spill control systems and discuss appropriate solutions and corrective actions. The following information on all deficiencies identified must be documented:

- Nature of the deficiency and its impact in the event of a spill.
- Recommended corrective action.
- Whether deficiency violates an existing or proposed regulation or a good engineering practices.

The SCC should review deficiencies and include them in the SPCC plan. The nature and priority of the corrective actions is determined by the potential risk to human health and the environment and by the cost of the corrective actions. Permit violations and citations are high on the list of deficiencies that require immediate correction. Figure 2-2 shows broad guidelines for determining corrective action priorities.

Figure 2-2
Illustrative Matrix For Determining Corrective Action Priorities

Consequences	Actual Loss of Primary Containment	Imminent Loss of Primary Containment	Potential Loss of Primary Containment	Inadequate Secondary Containment
Extensive Danger to Life, Health, Property	Remove from Service until Defects are Corrected			
Potential Danger to Life, Health, Property		Remove from Service or Repair Immediately While Area in Operations		
Limited Property Damage Only			Repair During Next Scheduled Maintenance	
Esthetic Damage Only				Repair Within Reasonable Period in Accordance with Applicable Regulations

2.7.4 Corrective Actions

Once a SPCC deficiency is identified, there may be several corrective action alternatives from which you may choose. In most cases, however, the regulations are restrictive. All corrective actions must be properly documented. If procedural changes are an option, they are often quicker, cheaper, and easier to implement than design changes.

2.8 PREPARING THE SPILL PREVENTION PLAN

The results of data collection, descriptions of operations, spill prevention methods, equipment and procedures used or planned, deficiencies encountered, and recommended corrective actions should be incorporated into the SPCC plan.

The general facility information portion of the plan should list the facility's name, location, and mission, a background of installation operations and spill risk assessment, spill history, and the name and location of potential spill sites. This part should be short and concise.

The activity-wide oil and HS spill prevention procedures portion should include a statement of the plan's policy and objectives, function and responsibilities of the SCC, and the minimum general requirements applicable to all potential spill sites within your activity including:

- Spill Reporting
- Visual Inspections
- Preventive Maintenance
- Good Housekeeping
- Standard Operating Procedures
- Employee Training
- Documentation and Records

Implementing these requirements is relatively low in cost and is generally independent of material/substance, equipment used, and area location. The requirements are discussed in detail in subsequent chapters of this manual.

Individual site-specific plans should be prepared for each potential spill site. The SPCC plan should include a general statement of site operations, oil and HS inventories, risk assessment and probable spill routes, specific spill prevention controls and countermeasures used for potential spill sources, existing deficiencies and proposed corrective actions. Specific control and countermeasures to be addressed include:

- Material Compatibility
- Integrity Testing
- Secondary Containment
- Drainage Control
- Corrosion Protection
- Overfill Prevention
- Traffic Collision Protection
- Security
- Marking and Labeling

Specific control and countermeasures will be determined by the spill source equipment (tanks, pumps, etc.), location and topographic constraints, oil and HS involved, potential health or environmental impacts, area or equipment age,

engineering design, effectiveness of the existing spill contingency plan, and applicable requirements.

Site-specific oil and HS-specific control and countermeasures are often subject to the discretion of the local regulatory agency and depend upon the site condition at each area. Therefore, their application and cost may vary widely from site to site. Guidance on control and countermeasures applicable to Naval areas subject to spill prevention regulations is provided in chapters 4 to 10 of this manual.

Specific guidelines for the review and update procedures section are provided in Section 2.10.

The supporting appendices of the SPCC plan should include all forms required for conducting and/or keeping records of inspections, preventive maintenance, testing, personnel training, SOPs, and project funding requests. The appendices should also include copies of the relevant regulations. A number of inspection forms developed for these purposes are included in Appendix E.

Appendix I, a sample plan for a fictitious Navy activity, has been developed to illustrate how a plan would look when prepared following the guidelines in this manual.

2.9 IMPLEMENTING THE SPILL PREVENTION PLAN

After the SPCC plan has been completed, it should be reviewed by the SCC and other necessary personnel for approval and implementation. Once approved, a professional engineer must certify it, attesting that he or she is familiar with applicable regulations, that he or she has examined the areas, and that the plan complies with good engineering practices and applicable requirements.

Finally, your area Commanding Officer should officially promulgate the plan, state the purpose, and direct all area personnel and organizations to support it fully.

2.10 PLAN REVIEW AND AMENDMENT

112.4
112.5

The oil and HS SPCC plan is a dynamic document which must be reviewed periodically and amended. The frequency of these reviews must be stated in the plan and should, as a minimum, occur at the following intervals:

- When there is a change in area design, construction, operation, and maintenance, which materially affects the area's potential for releasing oil and HS into the environment.
- When the NPDES or RCRA permit is issued, reissued, or changed.
- When the SPCC plan fails or proves ineffective in the prevention or containment of a spill event.
- At the request of an authorized official from an applicable enforcement agency.

- After enactment of or amendment to applicable laws and regulations, or changes in DOD or Navy policy, which affect the SPCC plan.
- After any changes in adjacent land or water use that would affect spill prevention and response considerations.
- As deemed necessary by the SCC or other authorized official.
- At least every three years, for oil areas and NPDES permitted areas which must comply with Best Management Practices under 40 CFR 125, Subpart K. Amendments should be implemented as soon as possible but no later than 6 months after a change occurs.

The SCC should be responsible for reviewing and amending the plan. The plan should be updated using the same procedures used to develop the plan initially (i.e. detailed field audits of each potential spill site). Special attention should be given to:

- New or changed locations and quantities of oil and HS
- Process changes that affect the potential and location of spills
- Changes in probable spill routes resulting from construction, particularly when it is unrelated to oil and HS.
- New spill prevention technology

The SCC should monitor any corrective actions that may result from amending the SPCC plan. The review and any resulting amendments or changes to the plan must be logged on a record sheet and attached to the plan. When significant changes or amendments are made to the plan, a PE must recertify the SPCC if the plan covers any oil handling areas (40 CFR 112).

CHAPTER 3

CHARACTERISTICS OF SPILLS

3.1. INTRODUCTION

This chapter identifies the types of oil and hazardous substances (HS) used by the Navy; sources and causes of spills; potential impacts of an oil or HS spill; and, typical deficiencies in oil and HS storage and transfer equipment, spill control equipment, and operational procedures which often lead to a spill.

3.2. CHARACTERISTICS OF OIL AND HAZARDOUS SUBSTANCES

The Navy uses large quantities of petroleum products and chemicals to accomplish each organization's mission. Petroleum products are used to operate vehicles, aircraft and vessels, to lubricate machinery, and to heat and provide power for Navy areas. Chemicals are used for many purposes, including painting and various cleaning operations.

3.2.1. Common Oils

Crude oil, as it is extracted from the ground, contains thousands of chemical compounds, most of which are composed of the elements carbon and hydrogen and are called hydrocarbons. Petroleum products are produced from crude oils in the refining operation, which initially uses distillation columns to separate the component compounds into fractions. These fractions or portions thereof (cuts) may be further processed, blended, or a combination of both to produce the products which meet specific requirements of the Navy. The necessary products are centrally procured in bulk quantities by the Defense Fuel Supply Center, Cameron Station, Alexandria, VA, to satisfy worldwide requirements. Navy products are delivered from refineries (after inspection by Government representatives) by tankers, pipeline, rail, or truck.

An appreciation of the various types of oils and their unique physical and chemical properties is important because they will affect an oil's storage requirements, spill behavior, and spill containment structure design. The paragraphs below discuss the various types of oil commonly used by the Navy.

3.2.1.1. Gasolines

The Navy purchases several grades of gasoline for use in vehicles, equipment, and aircraft, for varying conditions of climate and combat status. Gasolines have a

significant tendency to volatilize as indicated by the range of Reid vapor pressures of 5.5 to 7.0 psi for aviation fuels to 14 psi for automotive fuels. They also have low flash points (temperature at which sufficient vapors are given off to support combustion by a "spark" or other ignition sources). Consequently, these volatile materials can present a fire and explosion hazard to property and persons if spilled in a confined area. Additionally, gasolines have low surface tension and viscosity; as a result, gasoline spills spread quickly.

3.2.1.2. Turbine Fuels: Jet Fuels

The jet fuels used are JP-4, JP-5, and JP-5/JP-8 Standard. The two common jet fuels are JP-4 and JP-5. JP-4 fuel is the primary fuel for U.S. Air Force aircraft. This fuel is a wide cut, gasoline-based fuel with a flash point only slightly higher than that of gasolines. Its high volatility and low flashpoint presents significant explosion risk, therefore, JP-4 fuel cannot be carried on U.S. Navy combatant vessels safely. JP-5 fuel, the primary fuel for naval aircraft, is a kerosene-based fuel with a minimum flash point of 140°F and maximum specific gravity of 0.845. The specifications for JP-4, JP-5, and JP-5/JP-8 Standard are SPEC No. MIL-T-5624P, Turbine Fuel Aviation. Jet fuels have low viscosity and surface tension, and as result, jet fuel spills spread quickly.

3.2.1.3. Fuel Oil: Automotive Diesel

Three grades of diesel fuel oils are purchased for use in automotive diesel (compression ignition) engines. The specifications for these fuel grades are SPEC No. VV-F-800D, Fuel Oil, Diesel. These fuel grades, DF-A, DF-1, and DF-2, range in viscosity from 1.2 to 4.3 centistokes at 100°F and have flash points of 100°F or greater. DF-A is an arctic grade fuel for cold temperature use, DF-1 for use in the continental U.S. locations with low temperatures in the winter, and DF-2 is a general grade for summer use and moderate ambient temperatures.

3.2.1.4. Fuel Oil: Naval Distillate Fuel

Naval Distillate Fuel (NDF), formally known as Diesel Fuel Marine (DFM), is another fuel consumed by the Navy and is used principally on Navy vessels. NDF (SPEC No. MIL-F-16884H) has less tendency to form stable emulsions in water, is less viscous, and has a lower flash point than fuels which it replaced. This low-viscosity liquid can be expected to spread rapidly over any surface on which it is spilled.

3.2.1.5. Fuel Oil: Burner Oils

Burner fuel oils are used by the Navy for heat and power generation as described in ASTM D396 (DoD Adopted), Standard Specification for Fuel Oils. These oils are numerically graded 1 through 6.

Grades Number 1 and Number 2 are distillate or "light end" fractions with a maximum viscosity in the range of 2.2 - 3.6 centistokes at 100°F, a minimum flash point of 100°F, and a specific gravity of approximately 0.85. Generally, Number 1 is used in space heaters, and Number 2 is used for residential heating.

Grade Number 3 is no longer used.

Grade Number 4 oil is rarely used, although it is available as light residual or heavy distillate cuts. Grade Number 5 burner oil is also available in light and heavy cuts of the residual oil fraction. Heavy residual (grade 5) has a viscosity range of 75 -162 centistokes at 100°F, and a flash point of 130°F, reflecting the intermediate characteristics of this fuel oil.

Grade Number 6 oil is very viscous. This residual oil, also known as Bunker C, is used in many commercial ships and shore station power plants. This oil has a flash point of 150°F and viscosity in the range of 92 to 638 centistokes at 122°F. It must be heated prior to use to facilitate handling. Low-grade fuel oils such as Number 6 (in addition to heavier fraction oils such as lube oils) are less mobile, less likely to deteriorate gaskets and seals, and less toxic than the lighter fraction fuels and oils.

3.2.1.6. Lubricating Oils

The lubricating (lube) oils used by the Navy include both synthetic and natural petroleum products. No synthetic products are purchased in bulk quantities for use in the Navy. The three types of petroleum base lubricants handled in bulk by the Navy are: Aircraft Piston Engine Oil (ANSI/SAE J1899-95, DoD Adopted); Shipboard Diesel Engine Oil (SPEC No. MIL-L-9000H), which is commonly referred to as 9250; and steam turbine oil (SPEC No. MIL-L-17331H), which is commonly referred to as 2190 TEP. These lube oils are in the SAE 30-50 viscosity range, have high flash points, and very low volatility.

3.2.1.7. Transformer/Mineral Oils

Transformer oil is a petroleum based oil consisting of mineral oil, middle distillates, and other petroleum based products. It is a white or clear oily liquid with a slight hydrocarbon odor. It is used as a transformer cooling medium and typically is stored in small quantities at Navy facilities. Transformer oil has a typical boiling point in excess of 300 F and can ignite at temperatures approaching its boiling point. The inhalation of transformer oil at elevated temperatures or ingestion should be avoided.

3.2.1.8. Bilge Water

Oily wastewater is generated from ship bilges. In recent years, there has been a phase-out of donuts for the treatment of bilge water. As a result, bilge water is treated at shore facilities prior to direct discharge or disposal to industrial wastewater treatment facilities. For the purposes of spill planning, bilge water should be treated as oil.

3.2.2. Common Hazardous Substances

Common chemicals used by the Navy include solvents, acids, caustics, paints, pesticides, toxic and reactive metals, PCBs, compressed gases, petroleum fuels, and lubricants. A list of all HS under CERCLA can be found in 40 CFR 302. For spill prevention purposes, it is convenient to group these substances into corrosives, flammable/combustible liquids, compressed gases, poisons, oxidizers, reactive

substances, and organic peroxides. Table 3-1 lists HS commonly found in the Navy for each group. These groups have distinct chemical and physical characteristics, which are particularly important when addressing such things as storage compatibility, area design, equipment selection, and spill mitigation. The following paragraphs briefly review the characteristics of each group.

Table 3-1
Common Hazardous Substances Used At Naval Facilities

Corrosives
- Acetic acid
- Cresol
- Hydrochloric acid
- Hydrofluoric acid
- Sodium hydroxide (caustic soda)
- Sodium sulfite
- Sulfuric acid

Flammable / Combustible Liquids
- Aniline
- Ethylene glycol
- Glycolethers
- Hydrazine
- Isopropyl alcohol
- Ketone solvents (acetone, methyl ethyl ketone, methyl isobutyl ketone)
- Methyl alcohol
- Methylene chloride
- Mineral spirits
- N-hexane
- Paint thinner
- Paints
- Petroleum distillates
- Stoddard solvent (PD-680)
- Toluene
- Turco solvent
- Xylene

Compressed Gases
- Acetylene
- Ammonia
- Carbon dioxide
- Chlorine
- Freon®
- Helium
- Oxygen
- Nitrogen

Poisons
- 2,4-D
- Baygon
- Chlordane
- Diazinon
- Malathion
- Pentachlorophenol
- Pyrenone
- Sevin

Oxidizers
- Hydrogen peroxide
- Magnesium perchlorate
- Potassium perchlorate
- Silver nitrates

Reactive Substances
- Acetic anhydride
- Lithium
- Sodium

Organic Peroxides

3.2.2.1. Corrosives

Corrosives are any substances that significantly attack common metals or metal alloys and liquids with severe corrosion rates on steel (>0.25 in./year on SAE 2000 steel at 130°F). Corrosives contribute to significant equipment deterioration. They are commonly used in small quantities at most maintenance and repair shops and are also found stored in bulk at metal plating and cleaning shops, battery shops, and industrial waste treatment plants.

3.2.2.2. Flammable / Combustible Liquids

Flammable/combustible liquids have a flash point below 100°F and will readily ignite. Safeguards such as grounding, bonding, and proper ventilation are required. Flammable vapors of these liquids also expand when subject to high temperatures and can damage containers and even explode due to overpressurization. Flammable liquids require special lockers and protection against high temperatures. Many solvents and waste fuels are flammable. Flammable liquids are commonly stored in 55-gallon or smaller containers, although occasionally bulk tanks are used.

3.2.2.3. Compressed Gases

Compressed gases may be flammable, toxic, or strong oxidizers, and can displace air in enclosed storage areas and create a breathing hazard. Common Navy compressed gases includes acetylene, carbon dioxide, chlorine, Freon®, helium, oxygen, nitrogen, and other gases. Compressed gases are most often stored in cylinders, although chlorine is sometimes stored in 1-ton high-pressure tanks. Please note that spill prevention measures for compressed gases differs significantly from measures used for liquid and solid materials. For example, secondary containment cubing is not applicable. Compressed gases are not generally a threat to navigable waters, but a release may be toxic to humans or pose a fire or explosion hazard.

3.2.2.4. Poisons

Poisons are toxic to humans or other forms of life, even in very low doses, and can have adverse acute or chronic effects. Extreme care must be taken to avoid exposure during handling. Common Navy poisons includes insecticides, pesticides, rodenticides, and herbicides. These materials are normally found at pest control shops in small containers (5-gallon) and 55-gallon drums.

3.2.2.5. Oxidizers

Oxidizers yield oxygen readily to stimulate the oxidation or even combustion of other materials. Compatibility considerations are important to avoid container deterioration and adverse reactions with storage and transfer systems. Common Navy oxidizers, such as cleaning and photographic solutions, are found in small quantities and stored in 55-gallon or smaller containers, although larger quantities may be found stored in tanks.

3.2.2.6. Reactive Substances

Reactive substances ignite spontaneously when exposed to water or air and may even generate a violent reaction. These chemicals require air and water tight containers and must be stored away from all sources of air and water such as fire control systems. These substances are not widely used in the Navy. Lithium batteries, often used to power navigation aids, is an example of a water-reactive substance.

3.2.2.7. Organic Peroxides

Organic peroxide is any organic compound containing oxygen in the bivalent structure. Organic peroxide may be considered a derivative of hydrogen peroxide, where one or more of the hydrogen atoms have been replaced by organic radicals. Organic peroxides are extremely hazardous, since almost all of them are intrinsically unstable. These compounds potentially present serious fire and explosion hazards, and may deflagrate. They are commercially available as liquids and solids, although most are generally dissolved in water or an organic solvent to reduce the concentration. Organic peroxides are not too common or widely used at Navy areas, only for specialty uses such as research, explosives, or repellents, and are commonly stored in small containers.

3.3. SOURCES AND CAUSES OF SPILLS

Any of the Navy oil and HS areas and associated equipment listed in Section 2.4 is a potential source of spills. Drums and smaller containers are the most common way to use and store oil and HS at Navy facilities. Bulk storage is less common and is typically associated with oily waste and solvents, industrial waste, or some other form of industrial operation.

3.3.1. Oil Spills

Navy oil spills can occur at sea, in harbor, or ashore; however, Spill Prevention, Control and Countermeasure (SPCC) regulations are concerned with non-transportation-related spills ashore. In Fiscal Year (FY) 1996, 53% of the Navy's reported oil spills occurred ashore, yet accounted for 91% of the total volume spilled. Of these spills ashore, 75% were contained on land, while 16% reached a navigable waterway.

Past spills provide an insight into the typical cause of oil spills. Table 3-2 lists the causes of oil spills reported by naval activities in FY96. Being familiar with typical causes of spills can help to identify a strategy for SPCC and to help reduce the frequency and impact of spills.

3.3.2. Hazardous Substance Spills

Past spills provide an insight into the typical cause of oil spills. Table 3-3 lists the causes of HS spills reported by naval activities in FY96. Being familiar with typical causes of spills can help to identify a strategy for SPCC and to help reduce the frequency and impact of HS spills.

Table 3-2
Oil Spills by Cause, FY96

Cause	Number of Occurrences	Percent of Total Occurrences	Total Gallons Spilled	Percent of Total Spilled	Average per Occurrence (Gallons)
Act of God	14	2.2	865	0.4	62
Collision/Grounding/Sinking	6	1.0	2713	1.2	452
Container Leak	7	1.1	365	0.2	52
Contractor Error	2	1.9	267	0.1	22
Discovered	76	12.1	3744	1.7	49
Equipment Failure	118	18.8	36,002	16.0	305
Explosion	1	0.2	1	0.0*	1
Leaching/Heat Expansion	5	0.8	25	0.0*	5
None	10	1.6	950	0.4	95
Other	89	14.2	6,170	2.7	69
Personnel Error	122	19.5	152,712	67.7	1252
Pipe/Hose Failure	49	7.8	3449	1.5	70
Structural Failure	16	2.6	10,236	4.5	640
Tank Overflow	48	7.7	6,441	2.9	134
UST Excavation/Maintenance	1	0.2	10	0.0*	10
Valve Failure/Loose/Leak	47	7.5	1,554	0.7	33
Vandalism	1	0.2	50	0.0*	50
Vent Mast Leak	4	0.6	111	0.0*	28
Total	**616**	**100**	**225,665**	**100**	**360**
Note: * = less than 0.5%					

Table 3-3
Hazardous Substance Spills by Cause, FY96

Cause	Number of Occurrences	Percent of Total Occurrences	Total Gallons Spilled	Percent of Total Spilled	Average per Occurrence (Gallons)
Act of God	7	9.5	68	0.0	10
Container Leak	6	8.1	296	0.1	49
Contractor Error	3	4.1	212	0.1	71
Discovered	5	6.8	40	0.0	8
Equipment Failure	12	16.2	998	0.5	83
Other	6	8.1	105	0.1	18
Personnel Error	21	28.4	203,474	97.8	9,689
Pipe/Hose Failure	6	8.1	2,128	1.0	355
Structural Failure	4	5.4	362	0.2	91
Tank Overflow	1	1.4	50	0.0	50
Valve Failure/Loose/Leak	3	4.1	217	0.1	72
Total	**616**	**100**	**225,665**	**100**	**360**

3.4. BEHAVIOR ON LAND

Spilled oil or HS will migrate over the surface or percolate through the soil until it reaches the water table. Surface migration will follow the terrain, collecting in low spots that are often parts of local drainage systems, to a waterway. Oil or HS absorbed into the ground and reaching a water table can contaminate water supplies and migrate to a waterway as shown in Figure 3-1.

Oil or HS spilled on the ground will also migrate along artificial fill areas such as building foundations and pipeline trenches. These spills present a hazard to life and property because of the volatility of petroleum products and some chemicals. Basements of nearby buildings and sewer lines are likely areas where explosive vapor concentrations may develop.

3.5. IMPACTS OF AN OIL OR HAZARDOUS SUBSTANCE SPILL

An oil or HS spill can affect many areas during a spill, as well as long after a spill. Impacts during an oil spill can be easily seen, such as oil on the water, oiled piers, closed beaches, and dead fish or birds. Conversely, impacts during a chemical spill are not as easy to notice. Likewise, long-term impacts on the environment from an oil or HS spill are not immediately seen.

3.5.1. Types of Impacts

3.5.1.1. Physical Impacts

Physical impacts are related to the mechanical effects of the spilled product, such as the soiling of structures, craft, shoreline, and wildlife. The fouling, corroding, or deteriorating of water supply intake screens and equipment may also occur.

3.5.1.2. Economic Impacts

Economic impacts relate primarily to direct dollar costs of spill cleanup, and product and property loss. However, economic impacts also include secondary costs such as injuries related to the spill, reduction in value or enjoyable use of private property, loss of commercial fish or shellfish crop, and reduced tourist trade at a resort area. Additional secondary costs related to a spill come from future construction projects planned at a past spill site; if a spill was not cleaned up properly, construction could be delayed or could require additional cost to properly remove the contamination.

3.5.1.3.Chemical Impacts

Chemical impacts relate to changes in chemical content of the affected area. An oil spill could potentially increase hydrocarbon content or change oxygen regimen of the affected water. An HS spill could dramatically change the chemical content of the affected area, to potentially dangerous conditions. Additionally, additives in oils, other petroleum products, and hazardous chemicals may be toxic to marine plant and animal life.

3.5.1.4. Biological Impacts

Biological impacts relate to oil or HS spill interaction with plants and animals, including direct toxic effects, food chain interference, or behavioral modifications.

3.5.1.5. Social Impacts

Social impacts relate to interactions of oil or HS spills with human values and behavioral patterns, such as diminishment of the aesthetic value and enjoyable use of the spill-affected area and its adjoining areas.

The most recognizable social impact of oil or HS spills is public and private interest group activity. Interest groups often seek action and information on oil or chemical spills shortly after they occur. Every effort should be made to give accurate information to the public on a regularly scheduled basis.

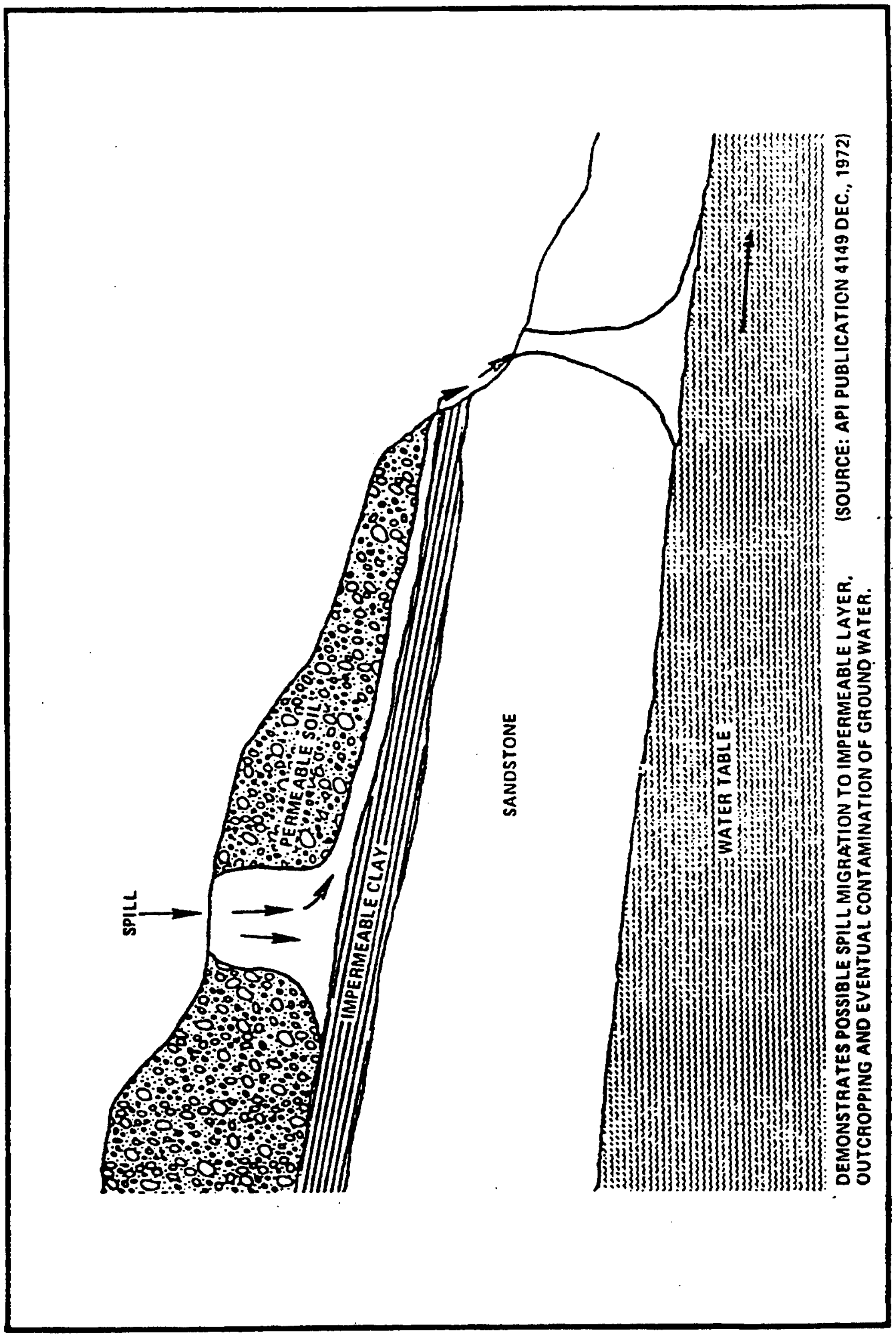


Figure 3-1
Possible Migration Path of Oil and Hazardous Substance Spilled on Land

3.5.2. Factors Affecting Impact

The factors affecting the impact of an oil or HS spill are directly influenced by the quantity, frequency, type, condition, and the location of the spill.

In general, the greater the quantity of material spilled the greater the impact. However, for some HS, the impact is just as great for a small quantity spill. Keep in mind, small but frequent spills do not allow an affected area to recover and can have the cumulative effect of one large spill.

Different types of oils will have different impacts. Light oils such as gasoline and jet fuels will percolate into soil more readily and spread more quickly than heavy oils, thus endangering ground water supplies. Aboveground spills of light fuels evaporate rapidly and leave little undesirable residue; however, they constitute a flammability hazard under many circumstances. Heavy fuels are more visible. They easily contaminate the materials they contact and affect the aesthetic value of the area. Certain fuel additives such as lead could complicate and increase the amount of effort required to clean up a spill site.

Different types of HS may produce various impacts as well. Depending on the type of HS spilled, it may cause permanent damage to the effected area, such as equipment, or flooring. This may substantially impact operation, and possibly lead to a halt in operation.

Compressed gases are not generally a threat to navigable waters, but a release may be toxic to humans or pose a fire or explosion hazard. Many HS are flammable, and if handled improperly, or spilled, may ignite. A reactive substance spill may cause a fire or violent reaction if spilled in water. In addition, a poison spilled may cause serious injury.

The condition of the material is another factor that affects the impact of a spill. For example, as oil is exposed to the environment the light fractions evaporate leaving a residual mass, of heavier organics. Usually this is less harmful to the environment, but it creates physical and economic impacts. In addition, the chemical composition of the HS may alter, which may lead to hazardous impacts.

The location of the spill will influence its impact. For oil and petroleum products, small quantities of gasoline spilled in open harbor waters without commercial fish will evaporate readily and have minimal effects. However, if the spill is surrounded by sensitive areas such as estuaries, recreational beaches, commercial and recreational fishing, then the impacts are greater. For HS, the location of the spill greatly influences the impact. An HS spilled in an open area may evaporate, or be absorbed into the surface with minimal impacts. If, on the other hand, the HS is spilled on an important surface, or equipment, the impact may cause failure, deteriorate the item, or ultimately halt operation.

3.6. TYPICAL SPCC DEFICIENCIES

3.6.1. Oil and Hazardous Substance Storage and Transfer Deficiencies

The equipment and structures that provide primary storage and distribution of oil and HS are high-risk locations for a spill. The equipment and structures include storage tanks, transfer pipeline, loading and unloading racks, and related items such as pipe supports, tank overflow prevention devices, and corrosion protection systems. Table 3-4 identifies typical storage and transfer deficiencies which can result in a spill.

Table 3-4
Typical Storage and Transfer Deficiencies

Inadequate containment structures
Leaks from underground storage tanks
Tank leaks due to corrosion or worn parts
Tank leaks through seams and rivets
Tank overfilling due to level instrument failure
Leaks from heating coils in tanks containing heavy fuel
Tanks and piping damage by collision with mobile equipment
Tank and piping damage from inadequate supports
Pipeline fracture due to improper installation
Leaks from hose and piping ruptures
Leaks in pipes, valves, and fittings
Leaks from damaged loading connections
Leaks from loading arms, especially joints and gaskets
Susceptible to wind/weather damage or flooding

To remedy the deficiencies presented in Table 3-4, 40 CFR 112.7 requires the construction of adequate storage and transfer areas and regular inspection of these areas to assure that the structures and equipment will indeed serve their purpose of controlling and minimizing the impact of a spill. Chapters 4 and 5 of this manual provide the guidance needed to evaluate and correct deficiencies in storage and transfer areas.

3.6.2. Spill Control Equipment Deficiencies

Although an area may already have SPCC measures in place, the equipment could be insufficient in many ways. Table 3-5 lists common deficiencies of spill control measures or equipment that have been installed at oil or HS areas.

Table 3-5
Typical Deficiencies In Spill Control Equipment

Improper segregation of "clean" and "dirty" runoff
Improper storm water retainment
Inadequate drainage control structures
Inadequate containment volume
Insufficient sump capacity
Leaks in containment dikes
Dike drain valve unintentionally left open
Inadequate treatment unit design and installation
Breach in curbs, drains, and spill collection system
Level sensor failure
Breaches in security allowing sabotage or vandalism
Insufficient lighting at oil and HS areas
Overfill prevention equipment failure

To remedy the deficiencies presented in Table 3-5, 40 CFR 112.7 requires the construction of adequate spill containment structures to contain a potential full-capacity spill; the monitoring of drainage and treatment of contaminated drainage; and the implementation of security measures such as valve locks, area lighting and area fencing. In addition, 40 CFR 112.7 requires regular inspection of spill containment structures and drainage equipment to assure that the structures and equipment will indeed serve their purpose of controlling and minimizing the impact of a spill. Chapters 7, 8 and 9 of this manual provide the guidance needed to evaluate and correct deficiencies in area spill containment structures, drainage control equipment, and security measures.

3.6.3. Operational Deficiencies

Spills can result from the improper operation and maintenance of storage and transfer areas, spill containment, drainage control, and security equipment and structures. Examples of operational deficiencies are presented in Table 3-6.

Table 3-6
Typical Operational Deficiencies

Improper storage procedures
Spills from the unattended draining of tank water
Operators incorrectly setting loading meters, and as a result, overfilling the tank
Overfilling tank trucks, tank cars, barges, and tankers
Incompatible material mixing from improper identification of fill ports
Improper maintenance of tank, pipe, valves, fittings, and instrumentation and controls
Spills from quick-connect coupling operation
Spills from line flushing
Leaks from pump seals due to lack of maintenance
Plugging of drainage system by debris
Inadequate material handling and equipment
Improper operation of drainage control structures
Improper operation of stormwater treatment units

Finally, 40 CFR 112.7 requires that personnel be instructed and briefed on proper spill prevention procedures and requirements; area personnel use standardized written operating procedures; inspections are routinely performed to insure proper operation of equipment; and records are maintained to document the successful implementation of these personnel requirements. Chapters 4 through 9 of this manual provide the guidance needed to evaluate and correct deficiencies in operation and maintenance of storage and transfer areas, spill containment, drainage control, and security equipment and structures. Chapter 10 in this manual provides guidance in identifying SPCC deficiencies during inspections.

CHAPTER 4

OIL AND HAZARDOUS SUBSTANCE STORAGE

4.1. INTRODUCTION

The Navy uses several types of storage areas to satisfy a variety of needs and mission requirements. Bulk storage areas normally store oil and hazardous substances (HS) in large aboveground storage tanks (ASTs) and underground storage tanks (USTs). Non-bulk storage areas include hazardous substance storage areas, hazardous waste (HW) accumulation storage points, and other container storage sites for oils and HS. This chapter provides specific guidance for identifying and evaluating deficiencies in oil and HS storage areas relative to spill prevention and recommends corrective measures to insure compliance with applicable requirements. Area related guidance is a general SPCC guidance that addresses multiple regulations, not just 40 CFR 112. This chapter also discusses the use of storage tanks and other types of storage containers (i.e., drums, cylinders, cans, etc.). Bulk transfer and pipeline areas are discussed in Chapter 5.

Bulk oil storage areas use large ASTs and USTs for storing millions of gallons of oil to support aircraft operations or to drive a power plant. These areas commonly consist of several large (200,000 gallon and greater) ASTs or USTs or a farm of smaller tanks. Smaller oil storage tanks, 1,000 to 5,000 gallon capacity, are commonly used such as day tanks to fire boilers or fuel tanks to support equipment such as emergency generators. Portable oil storage units of 3,000 gallons and below, called bowsers or buffaloes, store lubricants or fuels for field operations. Bulk ASTs are also used to store process chemicals for several operations including wastewater treatment plants, metal plating, metal finishing, paint stripping, degreasing, and fire fighting practice areas.

Bulk storage areas, due to the quantity of material stored, have the highest potential for significant spills. Common spill problems associated with bulk storage areas include overfilling, hose or pipeline ruptures, leaks from worn or corroded parts, damage to tanks and pipes from inadequate supports or vehicle collisions, and improper identification of fill ports, leading to mixing of hazardous and incompatible substances.

Significant spills from non-bulk storage areas are unusual. However, small spills are common; spills can occur from leaking containers, accidental releases from

container handling, improper storage procedures, poor housekeeping, and inadequate containment structures.

4.2. STORAGE TANKS

Tanks are generally classified by the internal vapor pressure they are designed to sustain (atmospheric, low pressure, and high pressure). Naval activities use these tanks in a variety of ways to meet the specific storage requirements of the substances used.

Atmospheric tanks operate near atmospheric pressure and are used for the storage of low-volatility materials such as heavy oils, hydraulic fluids, antifreeze (ethylene glycol) and metal plating wastes. Common construction materials include welded and riveted mild steel, stainless steel, plastic, fiberglass-reinforced plastic (FRP), and concrete. The Federal Occupational Safety and Health Administration (OSHA) (29 CFR 1910.106) requires that atmospheric tanks be designed to operate at pressures from atmospheric through 0.5 psig. In many instances, these tanks are protected by pressure vacuum vents to maintain the pressure differential between the tank interior and the atmosphere.

Low-pressure tanks are designed to operate at pressures between 0 and 15 psig and are preferred over atmospheric tanks for storing volatile products (vapor pressure <15 psig) such as benzene, acetone, and light napthas. These tanks are normally constructed of steel and are equipped with pressure relief valves or ruptured disks to prevent pressure buildup. Vapor control devices may be required for low-pressure tanks to prevent hazardous gases from venting to the atmosphere. In practice, atmospheric tanks can be used in lieu of low-pressure tanks at the expense of significant vapor losses. However, local air quality requirements and product losses may restrict their use.

High-pressure tanks are used where the operating pressure exceeds 15 psig. The Navy uses high-pressure tanks primarily for the storage of compressed gases such as Freon®, chlorine, and propane.

The following tank operation and system parameters are identified and discussed in this chapter.

- Tank Construction and Materials
- Material Strength
- Storage Compatibility
- Corrosion Protection
- Grounding
- Internal Tank Heating Coils
- Level Controls
- Automatic Controls

- Secondary Containment
- Tank Testing
- Tank Inspection
- Leak Detection and Monitoring
- Certification

4.2.1. Tank Construction and Materials

A primary concern is that the tank type is adequate for the storage conditions (material stored, pressure, and temperature). A discussion of the numerous types of tanks available is beyond the scope of this manual. What is important is that by knowing the vapor pressure of a chemical at a given temperature, you can determine if the type of tank is appropriate to withstand the pressure. In actual conditions, temperatures may vary considerably along with other factors, such as excessive pressures occurring during filling operations. As a consequence, the approach presented in this section should be used only to identify chemicals that warrant pressure storage considerations.

Table 4-1 gives typical storage requirements for selected chemicals at standard conditions (25°C, atmospheric pressure).

Table 4-1
Storage Tank Type for Liquid Chemicals at Standard Conditions

Chemical	Tank Type		Chemical	Tank Type
Acetaldehyde	H		Ethylene diamine	A
Acetamide	A		Ethylene dichloride	L
Acetic acid	A		Ethylene glycol	A
Acetone	L		Ethylene glycol monoethyl ether	A
Acetonitrile	L		Formic acid	L
Acetaphenone	A		Freons®	H
Acrolein	L		Furfural	A
Acrylonitrile	L		Gasoline	A
Allyl alcohol	L		Glycerin	A
Ammonia	H		Hydrocyanic acid	L
Benzene	L		Isoprene	L
Benzoic acid	A		Methyl acrylate	L
Butane	H		Methyl amine	H

Table 4-1 Cont.
Storage Tank Type for Liquid Chemicals at Standard Conditions

Chemical	Tank Type		Chemical	Tank Type
Carbon disulfide	L		Methylchloride	H
Carbon tetrachloride	L		Methyl ethyl ketone	L
Chlorobenzene	L		Methyl formate	L
Chloroethanol	A		Naptha	A
Chloroform	L		Nitrobenzene	A
Chloropicrin	L		Nitrophenol	A
Chlorosulfonic acid	A		Nitrotoluene	A
Cumene	A		Pentane	L
Cyclohexane	L		Petroleum oil	A
Cyclohexanone	A		Propane	H
Dichloromethane	L		Pyridine	A
Diesel oil	A		Styrene	A
Diethyl ether	L		Sulfuric acid	A
Dimethylformamide	A		Sulfur trioxide	L
Dimethyl phthalate	A		Tetrachloroethane	A
Dioxane	L		Tetrahydrofuran	L
Epichlorohydrin	A		Toluene	A
Ethanol	L		Trichloroethylene	L
Ethyl acetate	L		Xylene	A
Ethyl benzene	A			

Key: A = Atmospheric, less than 0.5 psig
L = Low Pressure, less than 15 psig but greater than 0.5 psig
H = High Pressure, greater than 15 psig
Source: Ecology and Environment, 1982.

Most tanks are stable and properly designed for the intended operation. Structural elements must withstand the mechanical, hydrostatic, and thermal forces transmitted during normal operation; but tank systems are normally assumed to be designed properly. A review of design specifications and drawings is warranted only if inadequate design or adverse soil conditions is strongly suspected. Spill prevention

requirements are intended to question whether the tank's structural elements are adequate for its normal operating conditions.

The National Fire Protection Association, Inc. (NFPA) Code 30 addresses the design, construction, operation, testing, and maintenance of ASTs, USTs, and portable tanks whose capacity exceed 660 gallons and are used to store flammable and combustible liquids. The code covers tanks with low-pressure or high-pressure operating conditions. NFPA Code 30A, The Automotive and Marine Service Station Code, is also relevant for fuel storage tanks, piping, and ancillary equipment that are used at service stations. It is particularly useful as guidance for preventing spills from fuel dispensing units. NFPA Code 31, Oil Burning Equipment, contains guidance on fuel storage tanks that are used in conjunction with boilers and other oil burning equipment. NFPA Code 31 contains requirements for tanks that are less than 660 gallons in size and for day tanks that are installed inside of buildings. Specific NFPA spill prevention requirements are noted in each corresponding tank system discussed in the following sections.

RCRA regulations, 40 CFR 264.191, require the owner to determine that a HW tank system is not leaking or is unfit for use. This assessment must determine that the tank system is adequately designed, has sufficient structural strength, and is compatible with the waste(s) to be stored or treated. The purpose of this assessment is to ensure that the tank will not collapse, rupture, or fail. At a minimum, this assessment must consider the following: design standard(s); hazardous characteristics of the waste(s) that have been and will be handled; existing corrosion protection measures; documented age of the tank system; and results of a leak test, internal inspection, or other tank integrity examination.

The following guidelines are intended to give a better understanding of potential structural problems with tanks and to determine requirements to reduce the likelihood of spills. Unless a major structural problem is apparent (i.e., visible settlement of tank), corrective action is usually not warranted.

4.2.1.1. Aboveground Tanks

Aboveground tanks may be horizontal, vertical, partially buried (base and foundation), or totally elevated from the ground by column or supports. It is important to note that if more than 10% of the volume of the tank and associated piping is below the surface grade then the tank is regulated as an underground tank and must meet the requirements in 40 CFR 280 (see section 2.6.4 of this Guidance Manual for a full definition of regulated underground tanks). The SPCC should address field-constructed tanks even though they are deferred under 40 CFR 280. To assure the stability of aboveground tanks, it is necessary that the tank rests on a level, sound foundation. Small elevated horizontal tanks supported by small steel posts and tall, small-diameter vertical tanks are more susceptible to stability and anchorage problems than horizontal tanks that are not elevated. Figure 4-1 shows several types of typical above ground storage tanks.

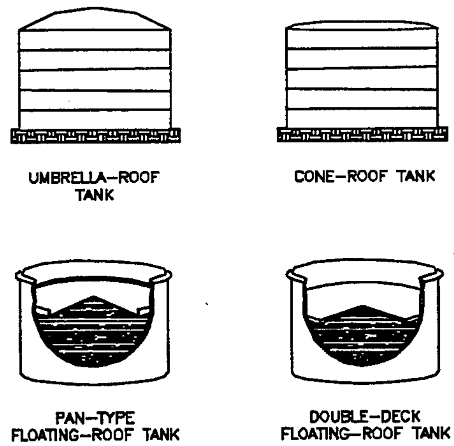
Vertical tanks are almost always installed directly on a concrete pad. Figure 4-2 shows a typical tank foundation on a concrete pad. Figure 4-3 shows a schematic of a ringwall foundation for a large outdoor vertical tank. The ringwall distributes the tank load and creates a more uniform soil loading condition and structural support. The outer wall of the tank is supported by the concrete ring, but inside of this ring, the floor of the tank may be underlain by compacted gravel or fill dirt. Due to this type of construction a leak may not be detected as it may seep straight down into the gravel or fill dirt. A foundation sealer and adequate drainage grading are important to prevent the accumulation of rainwater and minimize moisture under and around the tank to minimize spill risk.

Horizontal tanks are usually installed on legs or saddle supports; the legs or saddle supports should then rest on a level foundation. Figure 4-4 shows a horizontal tank resting on a saddle support. For adequate support, horizontal cylindrical tanks should rest on saddles that make contact on at least 120° of their circumference. To minimize potential point sources of corrosion, the ends and edges of these saddles should be angled to allow drainage of precipitation or spillage away from the tank surface. Ideally, contact should consist of a metal reinforcing wear plate hermetically sealed to the tank and a metal saddle resting on a concrete pier. An alternative, though less desirable, is resting the sealed plate directly on a concrete saddle. Decomposable material such as tar-saturated felt paper should never be used as a wear plate, since this provides a moist surface to encourage corrosion.

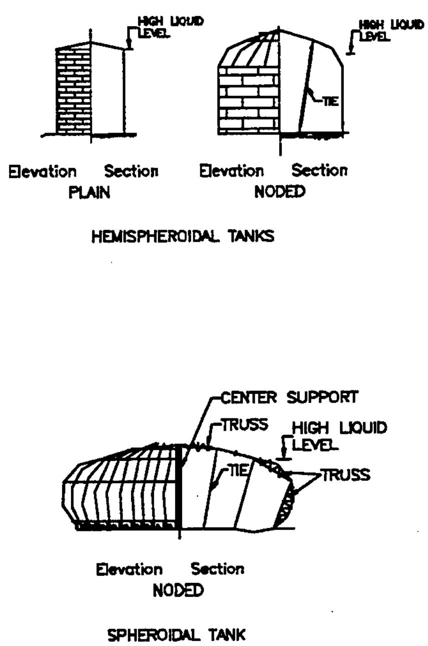
An EPA memorandum entitled "Use of Alternative Secondary Containment Measures at Facilities Regulated under the Oil Pollution Prevention Regulation (40 CFR 112)" states that in order for double walled aboveground tanks to provide substantially equivalent protection of navigable waters, they must meet the secondary containment requirement listed in 40 CFR 112.7(c) or:

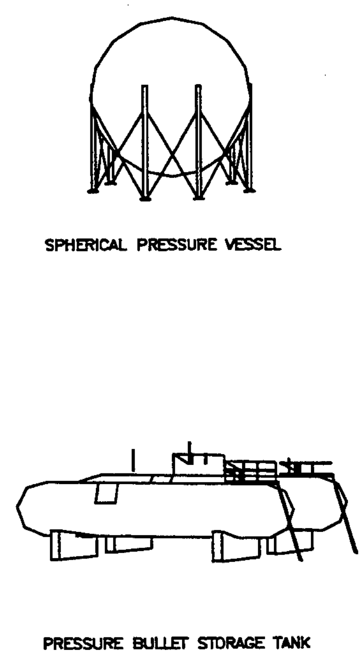
- individual tanks must have capacities less than 12,000 gallons
- inner tank constructed of Underwriters' Laboratory-listed steel tank
- outer wall constructed in accordance with nationally accepted industry standards
- tank has overfill prevention measures that include an overfill alarm and an automatic flow restrictor or flow shut-off
- constant monitoring of all product transfers
- manifolded tanks or other piping arrangements that would permit a volume of oil greater than the capacity of one tank to be spilled as a result of a single system failure must have a combined capacity less than 40,000 gallons

NFPA Code 30 also requires anti-siphon protection on double walled aboveground tanks. Without anti-siphon protection, a break in the delivery piping could cause the entire contents of a tank to siphon out onto the ground. Anti-siphon protection is also critical for all aboveground tanks that have delivery piping that extends outside of diked areas whenever any portion of the piping is lower than the liquid level in the tank.



(a) Atmospheric Tanks





(b) Low Pressure Tanks

(c) High Pressure Tanks

Figure 4-1
Typical Aboveground Storage Tanks

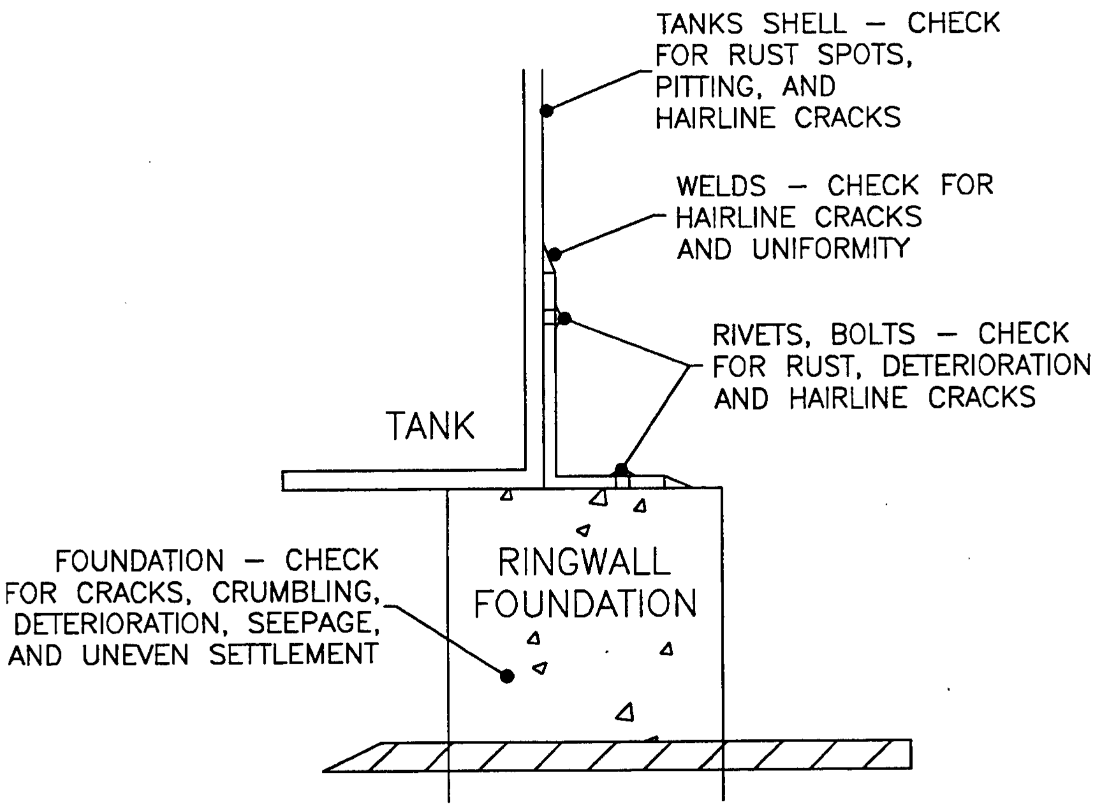


Figure 4-2
Typical Tank Foundation - Areas of Concern

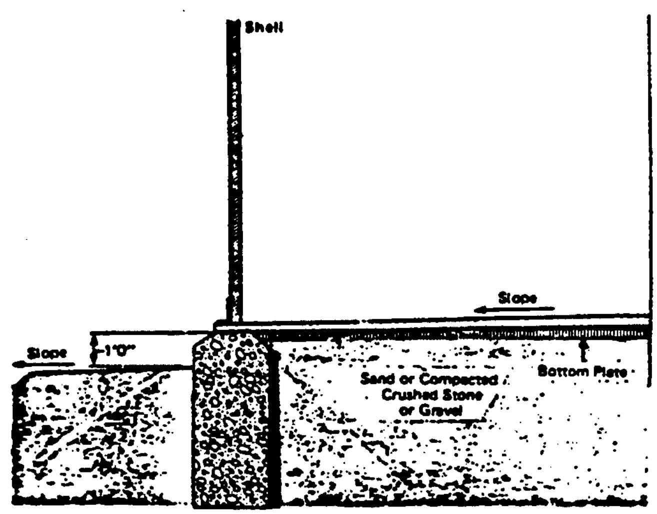


Figure 4-3
Illustrative Ringwall Foundation

Whether the tank rests directly on a concrete pad or on legs or saddle supports, the foundation must be free of cracks and deterioration. A crumbling or uneven foundation can lead to corrosion or can result in added stresses to the tank. This can result in tank failure and release of stored material; therefore, a cracked, crumbling, or otherwise deteriorating foundation must be repaired. Tank legs or stands should also be inspected for integrity and deterioration or corrosion. In addition, anchor bolts should be checked for tightness. Unstable, wobbly tank legs are cause for replacement. Saddle supports should be checked for cracks, buckling, or crumbling and should be repaired as necessary.

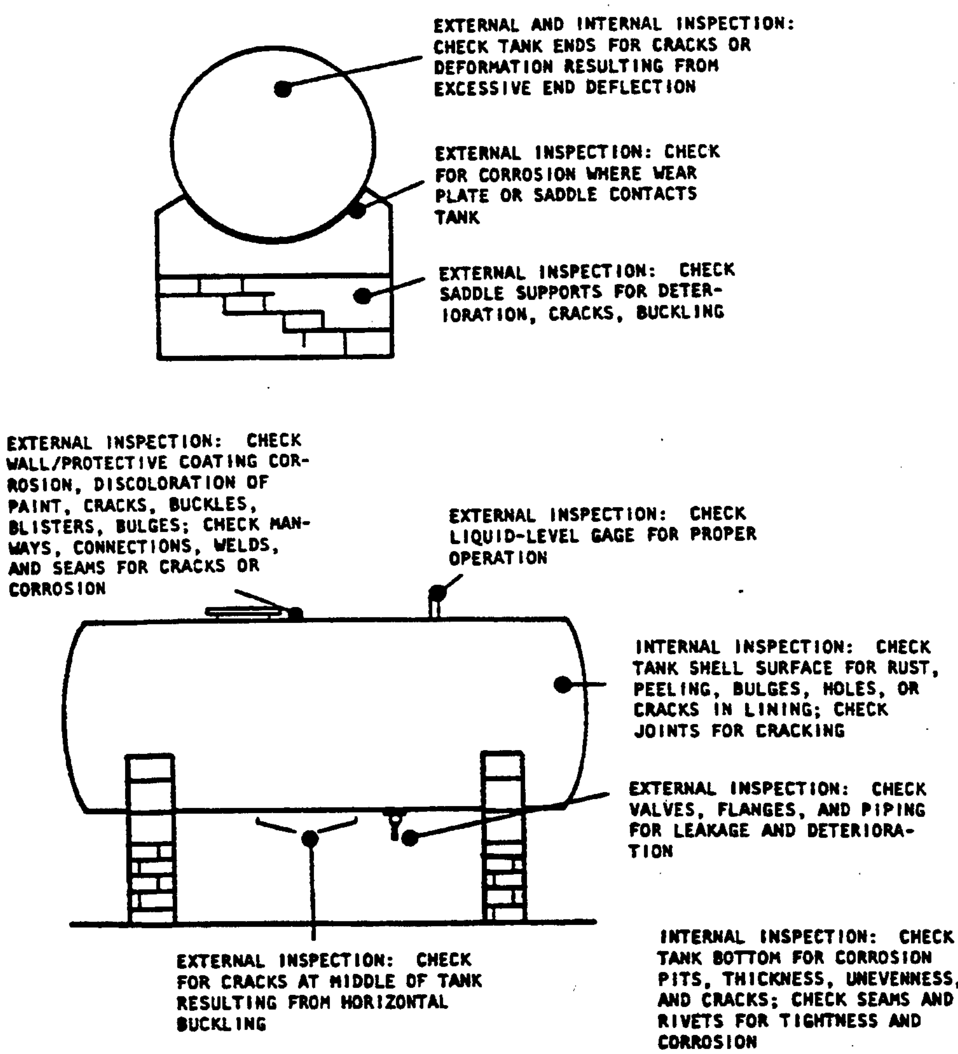


Figure 4-4
Typical Saddle Supports - Areas of concern

4.2.1.2. Underground Tanks

Underground tanks are typically horizontal since more uniform support can be achieved. This uniform support eliminates the structural support problem encountered with horizontal aboveground tanks.

USTs located in areas with a high water table or flooding are subject to floating. Several methods are used to prevent flotation:

- Placing the tank at a sufficient depth;
- Adding a thicker slab at grade;
- Anchoring the tank using deadmen anchors, (see Figure 4-5);
- Anchoring the tank using a hold-down pad ; and
- Anchoring the tank using mid-anchoring (this is to be used on a limited basis only after consulting the tank manufacturer).

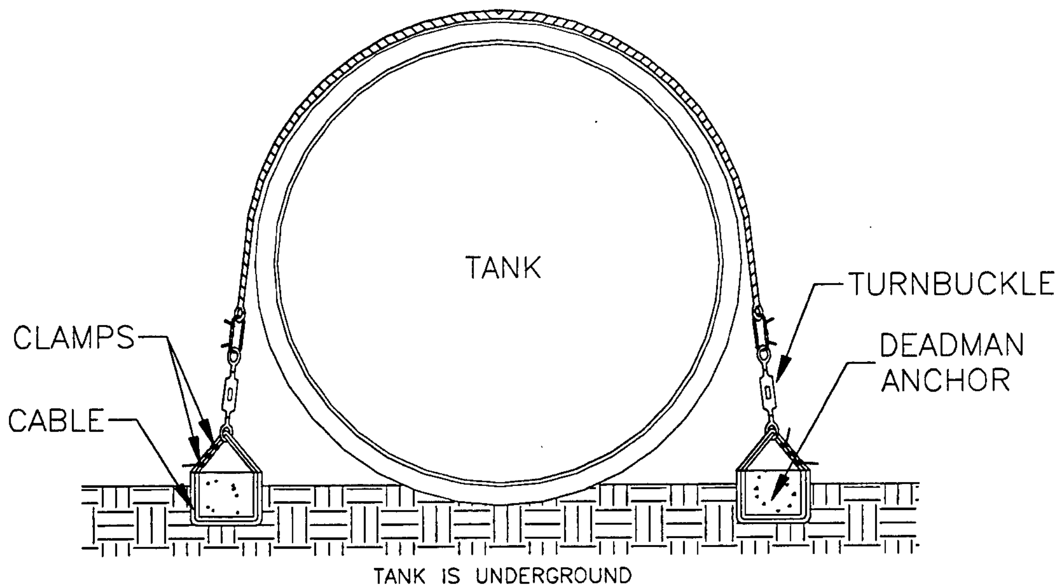


Figure 4-5

Deadman Anchor

Placing the tank at a sufficient depth with adequate backfill is the most common method used to prevent floatation. Increasing the thickness of the at grade concrete pavement also helps. Mid-anchoring is used infrequently, since improper installation may damage protective coatings or the shell of the tank or violate the electrical isolation of cathodically protected steel tanks.

A major problem with underground tanks is that due to their inaccessibility, structural stability problems can not be readily identified. New UST requirements (40CFR 280) establish very stringent design and installation requirements geared towards eliminating these problems.

Double walled underground storage tanks are required to follow the requirements of USTs as listed in 40 CFR 280. The use of double walled tanks as a means of secondary containment is discussed in 40 CFR 280.42(b)(1), and regulations on interstitial monitoring are written in 40 CFR 280.43(g). The major requirements for regulated USTs are provided in section 2.6.4 of this document.

4.2.1.3. New Tank Construction — 280.20

New underground storage tanks must be constructed and installed in compliance with 40 CFR 280. New tanks can be constructed of fiberglass-reinforced plastic (FRP), cathodically protected steel, or steel FRP composite. Metal tanks without corrosion protection can be used if a corrosion expert determines that the soil is not sufficiently corrosive to cause the tank to fail during the operating life. The owners and operators must maintain records for the operating life of the tank showing that unprotected tanks are not subject to corrosion.

The associated piping of underground storage tanks must meet the same material and corrosion requirements as the tanks. Corrosion protection is discussed in Section 4.2.4.

4.2.1.4. Upgrading of Existing UST Systems — 280.21(a)

By December 22, 1998, all USTs must comply with the following requirements as specified in 40 CFR 280:

a) same performance standards as new tanks

b) upgrade requirements

c) closure requirements

The upgrade requirements include lining the tank or providing cathodic protection, or a combination of both. If the tank is lined, it must be installed in accordance with 40 CFR 280.33. Cathodic protection in required to be in accordance with 40 CFR 280.21 (b)(2).

4.2.2. Material Strength

Another consideration is the material strength of the tank. Mild (carbon) steel is widely used for both aboveground and underground tanks and appurtenances due to its strength, durability, and low cost, but it is very vulnerable to corrosion. Proper corrosion control techniques can significantly enhance mild steel's resistance to severe internal and external conditions. Stainless steel offers superior corrosion resistance to chlorinated organics and acids compared to mild steel, but it is more expensive. FRP tanks have high-corrosion resistance but lack the structural strength, performance at

elevated temperatures (above 200°), and impact resistance of steel tanks. These constraints limit their use to operating pressures close to atmospheric and conditions of minimal structural demands. OSHA regulations prohibit the use of FRP tanks for above ground storage of flammable or combustible liquids.

4.2.3. Storage Compatibility

Another consideration in evaluating the adequacy of storage tanks is the degree to which the construction material of the tank and appurtenances are compatible with the stored material. The variety of chemicals used in the Navy have different physical and chemical characteristics and specific storage requirements. Many materials may undergo corrosion, loss of structural integrity, or total destruction when in contact with certain chemicals or combination of chemicals. Storing materials in an inappropriate tank can result in a leak, or worse, an explosive condition. This is a great concern when dealing with underground tanks or aboveground tanks with concrete bottoms, since leaks can go undetected.

40 CFR 264.172 also requires that tanks not contain hazardous substance or waste that are incompatible with the tank's construction. If a tank stores the material it was originally designed to contain, then it probably satisfies this requirement. However, tanks used to store HW and substances other than which they were intended may be inappropriate and should be carefully evaluated for compatibility. A typical example of incompatible storage is the storage of corrosive waste liquids in bare steel tanks.

A qualified professional should evaluate and certify the adequacy of any proposed chemical and material combination prior to actual storage. Chemical products should be removed promptly from incompatible tanks and pipes. This is particularly important for underground and partially buried tanks and pipes where leaks could go undetected for long periods of time. Appendix F contains a compatibility matrix between specific chemicals and a variety of construction materials. The chemicals listed are representative of materials commonly encountered at Navy activities. Because corrosion and reaction rates also depend upon other factors such as concentration, temperature, and humidity, the matrix presents only the general suitability of a chemical or material combination over a broad range of conditions. Therefore, the matrix should be used as a tool for preliminary screening of a material and chemical combination and for identifying gross incompatibilities between chemicals and tank materials.

The interior of some existing tanks can be lined with an appropriate material and reused. The cost-effectiveness of relining a tank will depend upon tank age, structural integrity, and how well the tank has been maintained. If a tank is too old or deteriorated, replacing it with a new tank may be more economical. Incompatible tank appurtenances such as access manholes, pipes, and valves, should be promptly repaired or replaced.

Another storage compatibility concern is the aboveground storage of oil with a true vapor pressure of 1.5 psia or more. Some examples are gasoline at any storage temperature or JP-4 where the temperature exceeds 70° F. In these cases, the tanks

should be equipped with an internal floating pan to control the presence of explosive vapors.

4.2.4. Corrosion Protection

Suitable methods of corrosion protection include: a coating with a suitable dielectric material; field-installed cathodic protection systems designed by a corrosion expert; impressed current systems designed to allow determination of current operating status; or cathodic protection systems operated and maintained in accordance with 40 CFR 280.31 or according to guidelines established by the implementing agency.

Increasing problems with chronic UST leaks due to corrosion have resulted in design requirements for new USTs. Federal guidelines for implementation of SPCC plans (40 CFR 112.7(e)(2)(iv)) state that new buried metallic storage tanks and piping should be protected from corrosion by coatings, cathodic protection or other effective methods, and should at least be subjected to regular pressure testing. Partially buried tanks for the storage of oil are not recommended unless the buried section is adequately protected (40 CFR 112.7(e)(2)(v)). New tank SPCC construction requirements are also in DM 22.

The corrosion prevention requirements of 40 CFR 280 address primarily new underground tank construction. However, 40 CFR 280.20 (a) requires that by December 22, 1998, all buried tanks be protected from corrosion by coatings, cathodic protection, or other effective methods compatible with local soil conditions. Since applying an exterior coating to a buried tank is seldom practical, installing a cathodic protection system can be an effective and practical corrective action.

Corrosion of the tank supports on aboveground horizontal tanks can be a problem. Horizontal tanks often come from the factory mounted on skids. If water is allowed in contact with these steel skids, then corrosion of the skids can be a significant problem. If possible, steel tank supports should be on elevated concrete pads which are angled so that precipitation drains away from the steel support structure. This is particularly important when the tank is surrounded by concrete curbing such that rainwater routinely accumulates around the tank. Another factor to be aware of is the floors of vertical aboveground tanks which may also be subject to corrosion.

RCRA hazardous waste regulation 40 CFR 264.192 also requires that all new ASTs and USTs used to store or treat HW be provided with an accepted form of corrosion protection such as fiberglass, protective coatings, double-walled tanks with continuous monitoring, and vaulted tanks equipped with man-ways for access to inspection and maintenance.

NFPA 30 also requires application of corrosion protection systems to flammable and combustible liquid USTs and associated piping.

4.2.4.1. Fundamental Concepts

Corrosion is the deterioration of a material because of a reaction with its environment. Plastics and other non-metallic materials may deteriorate rapidly when

exposed to certain corrosive chemicals. This is a chemical reaction that can be easily eliminated through proper selection (See Section 4.2.3) and careful handling of tank and piping materials.

The reaction is usually an electrochemical process wherein the metal tank reacts with its environment and oxidizes giving off electrons into the environment or into a different type of metal. Steel aboveground tanks in contact with the earth, steel underground tanks, and buried steel piping are all susceptible to corrosion. Corrosion can occur over the entire tank, piping, or in small-localized spots. When localized, corrosion may occur much more quickly, resulting in deeper holes. Corrosion control in metals is therefore more complicated and more strictly regulated. The American Petroleum Institute has tabulated steel tank and pipe failure data; corrosion is the major cause of all leaks.

The characteristics of soil, water, and air surrounding a tank or pipeline directly influence the rate of corrosion. Although corrosion of non-buried aboveground tanks and pipes is a concern, its presence can be easily detected and mitigated through routine inspections and maintenance. Partially buried and underground steel tank systems require special considerations to minimize corrosion from adverse soil conditions such as corrosive elements, poor soil aeration, high or low pH, high moisture or organic content, and low or non-uniform resistivity. Soils with a resistivity (resistance to direct current within the material) of 10,000 ohm-cm or less usually require corrosion protection. Many states are even more stringent and you should consult applicable state and local requirements. Table 4-2 provides relative corrosivities based on the different resistivities of soils.

Table 4-2
Soil Resistivity Classification

Resistivity - ohm-cm	Category
0-1,000	Very corrosive
1,000-5,000	Aggressive
5,000-10,000	Mildly corrosive
10,000-25,000	Slightly corrosive
Over 25,000	Progressively less corrosive

Source: Steel Tank Institute, R892-91, page 4

Corrosion may be eliminated by the proper application of protection methods. Table 4-3 lists several common corrosion control methods. One way to avoid corrosion damage from environmental conditions is to install tanks and piping constructed of fiberglass and PVC. Coating tanks and piping is another method of preventing corrosion, since the metal of the tank or piping is no longer in direct contact with the corrosive soil. Coating aboveground tanks and piping for corrosion protection is

common since the coating can be inspected. However, coatings can easily become damaged, and severe localized corrosion (pitting or pinhole corrosion) can occur where the damage occurs.

The most common corrosion protection methods applied to tanks are the application of protective coatings and/or installation of cathodic protection systems. A complete evaluation of the corrosion protection systems in existing tanks and pipes is beyond the scope of a SPCC plan. However, one should be able to tell if these areas are afforded adequate corrosion protection, if the systems operate properly, and if they are inspected and maintained. Use the following guidelines to identify and evaluate the adequacy of existing corrosion protection systems. If a system needs further evaluation, a corrosion control expert should be consulted.

Table 4-3
Corrosion Control Methods

Type of Corrosion	Control Methods
Uniform Corrosion	• Inhibitors • Protective coating • Anodic protection
Intergranular Corrosion	• Avoiding temperatures that can cause contaminant precipitation during heat treatment or welding
Pitting Corrosion	• Protective coating • Allowing for corrosion in wall thickness
Stress-Corrosion Cracking	• Reducing residual or applied stresses • Redistributing stresses • Avoiding misalignment of sections joined by bolts, rivets, or welds • Materials of similar expansion coefficients in one structure • Protective coating • Cathodic protection
Corrosion Fatigue	• Minimizing cyclic stresses and vibrations • Reinforcing critical areas • Redistributing stresses • Avoiding rapid changes in load, temperature, or pressure • Inducing compressive stresses through swaging, rolling, vapor blasting, chain tumbling, etc.
Galvanic Corrosion	• Avoiding galvanic couples • Completely insulating dissimilar metals (paint alone is insufficient) • Using filler rods of same chemical composition as metal surface during welding • Avoiding unfavorable area relationships • Using replaceable parts of the anodic metal • Cathodic protection • Inhibitors

Table 4-3 Cont.
Corrosion Control Methods

Type of Corrosion	Control Methods
Thermogalvanic Corrosion	• Avoiding non-uniform heating and cooling • Maintaining uniform coating or insulation thickness
Crevice Corrosion; Concentration Cells	• Minimizing sharp corners and other stagnant areas • Minimizing crevices to a minimum, especially in heat transfer areas and in aqueous environments containing inorganic solutions or dissolved oxygen • Enveloping or sealing crevices • Protective coating • Removing dirt and mill-scale during cleaning and surface preparation • Welded butt joints with continuous welds instead of bolts or rivets • Inhibitors
Erosion; Impingement Attack	• Decreasing fluid stream velocity to approach laminar flow • Minimizing abrupt changes in flow direction • Streamlining flow where possible • Installing replaceable impingement plates at critical points in flowlines • Filters and steam traps to remove suspended solids and water vapor • Protective coating • Cathodic protection
Cavitation Damage	• Maintaining pressure above liquid vapor pressure • Minimizing hydrodynamic pressure differences • Protective Coating • Cathodic protection • Injecting or generating larger bubbles
Fretting Corrosion	• Installing barriers which allow for slip between metals • Increasing load to stop motion, but not above load capacity • Porous protective coating • Lubricant
Hydrogen Embrittlement	• Low-hydrogen welding electrodes • Avoiding incorrect pickling, surface preparation, and treatment methods • Inducing compressive stresses • Baking metal at 200-300° F to remove hydrogen • Impervious coating such as rubber or plastic
Stray-Current Corrosion	• Providing good insulation on electrical cables and components • Grounding exposed components of electrical equipment • Draining off stray currents with another conducting material • Electrically bonding metallic structures • Cathodic protection

Table 4-3 Cont.
Corrosion Control Methods

Type of Corrosion	Control Methods
Differential-Environment Cells	• Underlying and backfill underground pipelines and tanks with the same material • Avoiding partially buried structures • Protective coating • Cathodic protection

4.2.4.2. Protective Coating Systems.

Protective coatings work by creating a barrier to moisture, oxygen, and electrical current, thus, sealing the metal tank from the corrosive environment. Protective coatings are applied to protect both exterior and interior surfaces. To stop corrosion completely, coatings and linings (interior surface) must provide the following:

- Form a uniform high-resistance to electrical current,
- Be pore free,
- Have excellent adhesion to the tank,
- Be resistant to damage due to impact and abrasion,
- Be resistant to moisture absorption,
- Be splash resistant to product spills,
- Resist degradation with time and exposure to the environment, and
- Be compatible with cathodic protection systems.

For the best results, coating materials should have high dielectric properties and should be applied to properly prepared surfaces. Some of the common coating materials used include polyurethanes, epoxies, and reinforced plastics. Coatings that are applied by the manufacturer generally perform better than coatings applied in the field. Normally, a good coating system decreases the size and cost of the cathodic protection system, as well as increases the life of the protection system.

Chemical compatibility and operating temperature are the prime considerations in coating evaluation or selection. Comparative resistances of typical coatings are provided in Table 4-4. However, these should be used for general information only, and manufacturers should be consulted for more detail.

Table 4-4
Comparative Resistances of Typical Coatings

Coating Type	Acid	Alkali	Salts	Solvents	Water	Oxidation	Sunlight and Water	Stress	Abrasion	Heat
Acrylic	8	8	9	5	8	9	10	?	10	8
Alkyd	6	6	8	4	8	3	10	5	6	8
Asphalt	10	7	10	2	10	2	7	5	3	4
Chlorinated Rubber	10	10	10	3	10	9	7	7	7	5
Epoxy	10	9	10	8	10	6	9	3	6	9
Furan	10	10	10	10	10	2	8	1	5	9
Inorganic (metallic)	1	1	5	10	5	10	10	?	10	10
Latex	2	1	6	1	2	1	10	?	6	5
Neoprene	10	10	10	4	10	6	8	10	10	10
Oil Base	1	1	6	2	7	1	10	4	4	7
Phenolic	10	2	10	10	10	7	9	2	5	10
Saran	10	8	10	5	10	10	7	7	7	7
Urethanes	9	10	10	9	10	9	8	?	10	8
Vinyl	10	10	10	5	10	10	10	8	7	7

Scale: 1 = Nonresistant
10 = Extremely resistant
? = Insufficient data

Sources: NACE, 1975, and Steiner, 1959.

It should be noted that buried tanks and piping that do not also have cathodic protection can suffer much faster corrosion damage than bare steel tanks and piping if the coating has been damaged in any way. Small holes in the coating cause corrosion to be greatly accelerated on the surface of the tank or piping exposed by the hole and the steel can corrode clear through much faster than if the coating was not there at all. Whenever possible, coatings should be used in conjunction with cathodic protection on buried tanks and piping. For aboveground piping systems, coating damage on aboveground piping may allow water to seep inside of the coating where it will collect and again cause greater corrosion damage than if the coating was not present.

Eroded coatings or linings are spill prevention deficiencies and should be repaired promptly to avoid the spread of corrosion. If the extent of corrosion can result in failure, or if the tank is already leaking, it should be removed immediately from service for proper replacement or repair.

DM-22 requires that underground steel piping systems be cathodically protected in addition to a coating or wrapping. NFGS 15192 requires that new underground steel pipes have a factory-applied polyethylene coating with an adhesive undercoat for diesel

and fuel oil pipes. Fittings, couplings and areas of damaged coating are to be covered with tape conforming to FS L-T-15.

Coatings and linings are economical retrofit alternatives to achieve chemical resistant tanks and pipes, but are not feasible or are highly impractical for inaccessible surfaces (i.e. buried tanks and pipes, pipe interior walls, tanks without manholes, etc.). Recoating and rewrapping of aboveground piping systems is commonly practiced throughout the Navy.

If the existing records do not indicate whether or not a UST has a protective coating, it may be possible to observe a coating through an access manhole or vault. It may also be possible to observe if venting piping has some type of coating that extends above the ground level; if the piping is coated, then it is very probable that the UST also has a coating.

4.2.4.3. Cathodic Protection

Cathodic protection reverses the electrochemical action of corrosion. Instead of allowing electrons to flow away from a steel structure (thereby permitting corrosion to occur), an electron flow toward the structure is induced, thereby protecting the structure. The method has wide application for both aboveground and underground structures and is often the only practical way to stop existing corrosion.

Cathodically protected systems can usually be identified by the presence of test stations, as presented in Figure 4-6. The test stations can be either wall mounted or flush mounted on the ground usually adjacent to walls, curbs, or guard posts. The test stations are usually installed for every tank and 200 lineal feet of piping.

There are two basic types of cathodic protection systems: the sacrificial anode system and the impressed current system. The sacrificial anode (i.e., a metal anode more negative in the galvanic series than the metal to be protected) is electrically connected to the tank or piping and buried in the soil. To prevent corrosion, a sacrificial anode such as magnesium or zinc, releases electrons and corrodes instead of the tank or piping. A typical sacrificial anode system is shown in Figure 4-7.

Some of the drawbacks of a sacrificial anode system include:

- Low-voltage generation. Zinc anodes generate only .25 volts and may be ineffective for soil resistivities of 2,000 ohm-cm or greater. Magnesium anodes produce from .7 to .9 volt driving potential, but are often ineffective for soil resistivities above 10,000 ohm-cm.
- Self-corrosion of sacrificial anodes reduces their usable protective current output efficiency to about 50% for zinc and 90% for magnesium.
- Highly corrosive environments can drastically reduce their useful life. Sacrificial anodes must be replaced frequently.

For these reasons, sacrificial anodes are used to protect relatively small areas, localized "hot spots" in a structure, well-coated structures, and locations where the impressed current method poses a hazard.

The impressed current system employs direct current from an external source to reverse the flow of electrons and prevent corrosion. Current is passed through the system by non-sacrificial anodes such as carbon or graphite, non-corrodible alloys, or platinum. These anodes are buried in the ground and connected to an external power supply. This method is preferably used for large, bare, or poorly coated surfaces. An impressed current system is illustrated in Figure 4-8.

Potential problems associated with this system include:

- Damage to the steel structure and its coating due to excessive voltage.
- Interruption of protection by power failure.
- Stray current interference from adjacent or nearby buried structures

A cathodic protection system does not ensure that a structure is properly protected against corrosion. Faulty cathodic protection constitutes a spill prevention deficiency and must be corrected. Not replacing sacrificial anodes when required, evidence of corrosion (rust spots, spalling, or flaking), or any of the above mentioned problems may indicate the system is not designed, operated, or maintained properly.

As a retrofit method, cathodic protection is particularly effective for underground applications, where it is impractical to excavate and coat buried tanks and pipes. Cathodic protection is more effective and less expensive on coated structures, since the amount of protective current required is proportional to the amount of bare metal exposed to the corrosive media. On bare tanks, cathodic protection may be only 90% effective, due to the existence of active pits into which the protective current cannot penetrate.

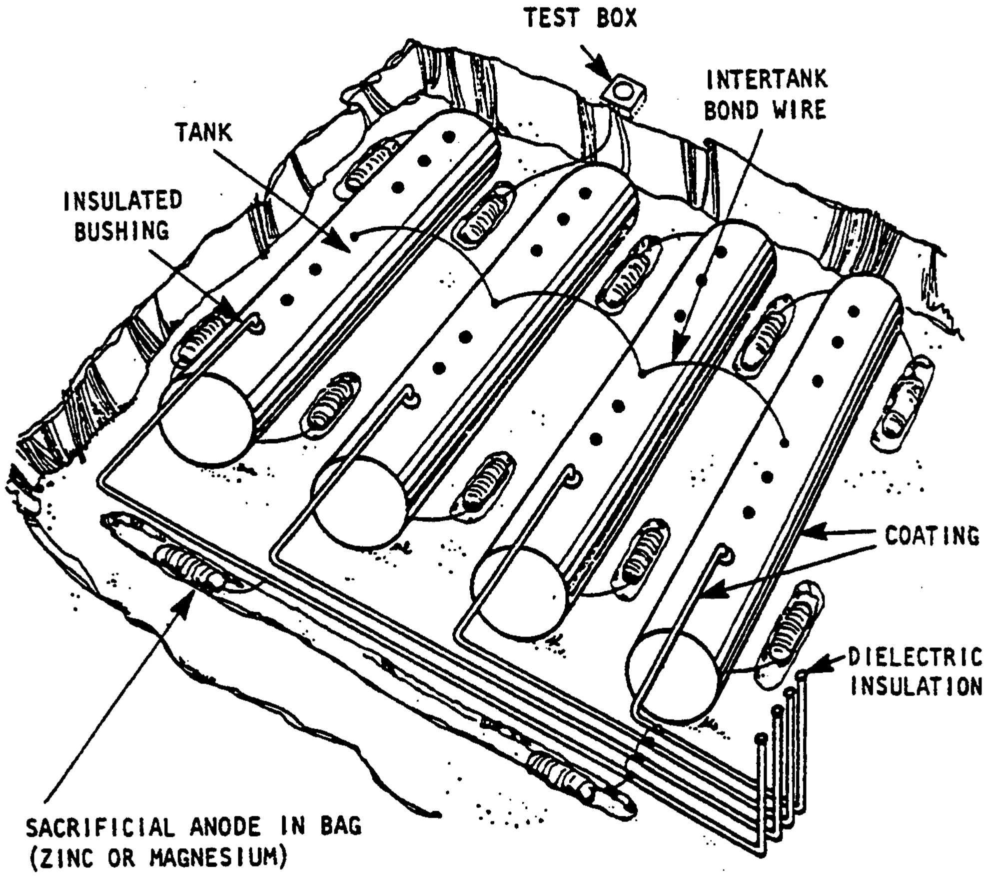
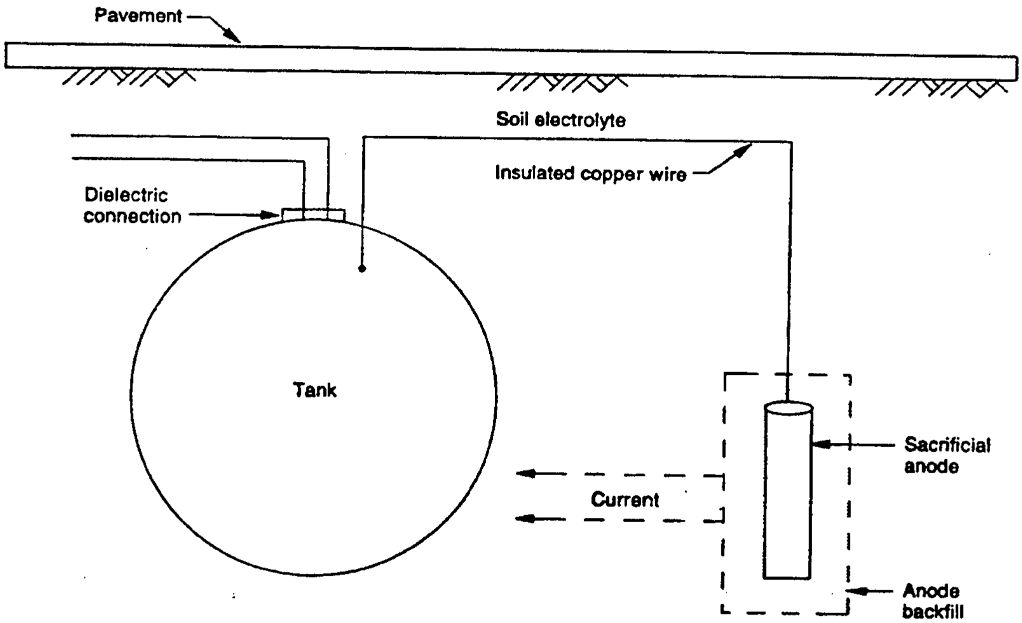


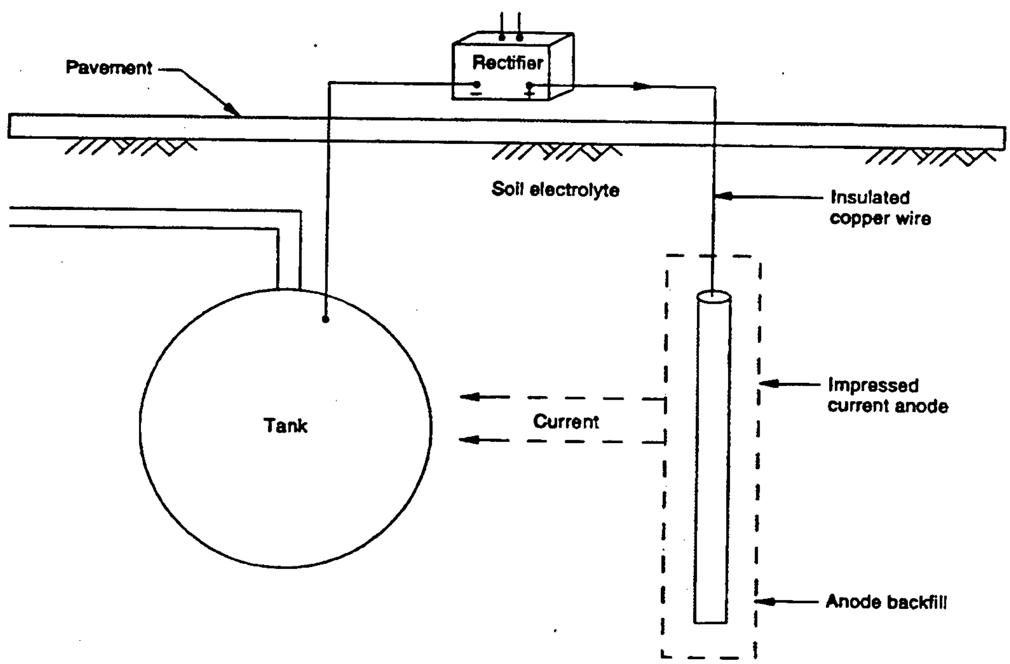
Figure 4-6
Sample Cathodic Protection Test Station Location

Sacrificial anode systems are generally not effective on bare tanks because of their low volt driving potential. Also, since sacrificial anodes need to be bonded to all system components being protected (in fact, threaded piping does not reliably provide the necessary electrical continuity), retrofitting entails exposing all system components and welding a bonding wire to these components. This can be costly and can require purging the system for safety. Therefore, impressed current systems are probably the best retrofit alternative for buried systems.



Sacrificial Anode Cathodic Protection

Figure 4-7
Sacrificial Anode System



Impressed Current Cathodic Protection

Figure 4-8
Impressed Current System

4.2.4.4. Other Methods

Other corrosion protection methods used include electrical isolation, corrosion inhibitors, and strikeplates. These systems should only be used in concert with cathodic protection or other acceptable method discussed above.

Electrical Isolation. This method isolates metal components using nonconductive fittings, bushings, flanges, connections, etc. This minimizes the potential for the generation of electrical currents between dissimilar metals, which reduces the likelihood of corrosion. Installation of non-conductive materials normally requires taking the tank system out of service until work is complete.

Strikeplates. These are metal sheets placed inside a tank to prevent corrosion of tank bottoms due to repeated mechanical impingement, such as gage sticks used for inventory control. Strikeplates must be carefully placed to be effective.

Corrosion Inhibitors. Inhibitors added to stored liquids can sometimes help control corrosion on the inside of a tank or pipe. Typical inhibitors include chromates, phosphates, silicates, organic sulfides and amines. Primary considerations and limiting factors include proper inhibitor selection, correct concentration determination and monitoring, and agitation of the liquid.

Corrosion-Resistant Materials. Some applications (e.g., piping for corrosive materials) require the use of corrosion-resistant piping materials. A variety of plastics are used by naval activities for such applications. Table 4-5 provides a summary of piping materials and their corrosion and chemical compatibility characteristics.

Table 4-5
Characteristics of Piping Materials
For Aboveground and Underground Service

Type of Pipe	Chemical Compatibility	Characteristics
Carbon Steel	Not compatible with corrosive chemicals such as acids.	Susceptible to corrosion if not coated, galvanized, cathodically protected (for underground service), or otherwise protected against corrosion.
Stainless Steel	Compatible with corrosive chemicals such as acids, depending on grade.	Used when product purity is of great concern. Primarily used for corrosion protection in product transfer applications when coated carbon steel will not suffice (e.g., at high operating temperatures).
Aluminum	Subject to attack by alkalis, traces of heavy metal ions such as copper, nickel, and mercury, and by prolonged contact with wet insulation.	Limited structural strength as compared to steel. Aluminum does not retain its structural strength at low temperatures. Used in product transfer applications involving substances that cannot be handled by steel, such as organic acids.

Table 4-5 Cont.
Characteristics of Piping Materials
For Aboveground and Underground Service

Type of Pipe	Chemical Compatibility	Characteristics
Nickel and Nickel Alloys	99% nickel, 0.06% carbonsed for halogen acids at high temperatures.	Useful for handling halogen acids at high temperatures, sodium chloride solutions, and caustic soda.
	99% nickel, 0.01% carbon used for fused caustic soda (sodium hydroxides).	
Lead and Lead-Lined Steel	Useful for handling sulfuric acid at moderate temperatures.	Lead has limited structural strength. It is customary to lay lead pipe in steel angles or wood troughs.
Copper and Copper Alloys	Has high resistance to industrial and marine atmospheres, seawater, alkalis, and solvents.	Copper has excellent low-temperature properties.
	Oxidizing agents rapidly corrode copper. However, alloys have somewhat different properties than commercial copper.	Cupro-nickel is applicable in seawater services. Bronze pipe generally performs well in hydrocarbon service.
Plastic Tube and Pipe	Various plastics can be selected for their resistance to specific chemicals	Free from internal and external corrosion. Allowable stresses and temperature limits are low. Low structural strength when compared to steel. Coefficients of thermal expansion are high. Should be protected from fire exposure in accordance with OSHA regulations.
	(1) Polyethylene pipe and tubing have excellent resistance to salts, sodium and ammonium hydroxides, and sulfuric, nitric, and hydrochloric acids.	
	(2) Polyvinyl chloride pipe and tubing have excellent resistance at room temperatures to salts, alcohol, ammonium hydroxide, and sulfuric, acetic, nitric, and hydrochloric acids; may be damaged by ketones, aromatics, and some chlorinated hydrocarbons.	
	(3) Polypropylene pipe and tubing have excellent resistance to most common organic and mineral acids and their salts, strong and weak alkalis, and many organic chemicals.	

Table 4-5 Cont.
Characteristics of Piping Materials
For Aboveground and Underground Service

Type of Pipe	Chemical Compatibility	Characteristics
Plastic-Lined Piping	See plastic pipe.	Combines the chemical resistance of the various plastics and the tensile and structural strength of steel.
Fiberglass/ Fiberglass-Reinforced Pipe	Compatible with a wide range of corrosive chemicals, including acids, bases, and hydrocarbon solvents	Less structural strength than steel. High resistance to external and internal corrosion. Should be protected from fire exposure in accordance with OSHA regulations.

4.2.5. Grounding

Because of the possibly explosive environment of fuel tanks, DM-22 requires the grounding or bonding to a grounded network of certain items related to fuel storage. Although the grounding of a tank system is not directly related to spill prevention, it is a requirement of tank design. The SPCC inspector or environmental coordinator should check for proper grounding when inspecting storage tanks. Items such as electrical equipment, aboveground tanks, and pipe support columns are required to be grounded. Refer to DM-22 for details on grounding and bonding of fuel areas.

4.2.6. Internal Tank Heating Coils

Standard practice in colder climates is to heat heavier fuel oils, such as No. 6 oil, stored in aboveground tanks. Saturated steam is the preferred heating medium; however, hot oil, hot water, or electric heating is also used where steam is not available. Specific details regarding heating coils are found in DM-22.

Heating coils using steam or hot water that discharge to the environment may be the source of a oil leak. During summer months, when heating coils are idle, condensate lying in the coil internally corrodes the coil metal. Oil enters the coil and is later discharged with the steam or hot water.

In some fuel oil heating systems, the exhaust steam and condensate are returned to the boiler water feed system. If oil enters the boiler feed system, it can insulate and burn the boiler tubes and drums, possibly resulting in metal failure and explosion.

40 CFR 112.7(e)(2)(vii) states that to control leakage through defective internal heating coils, the following factors should be considered and applied, as appropriate.

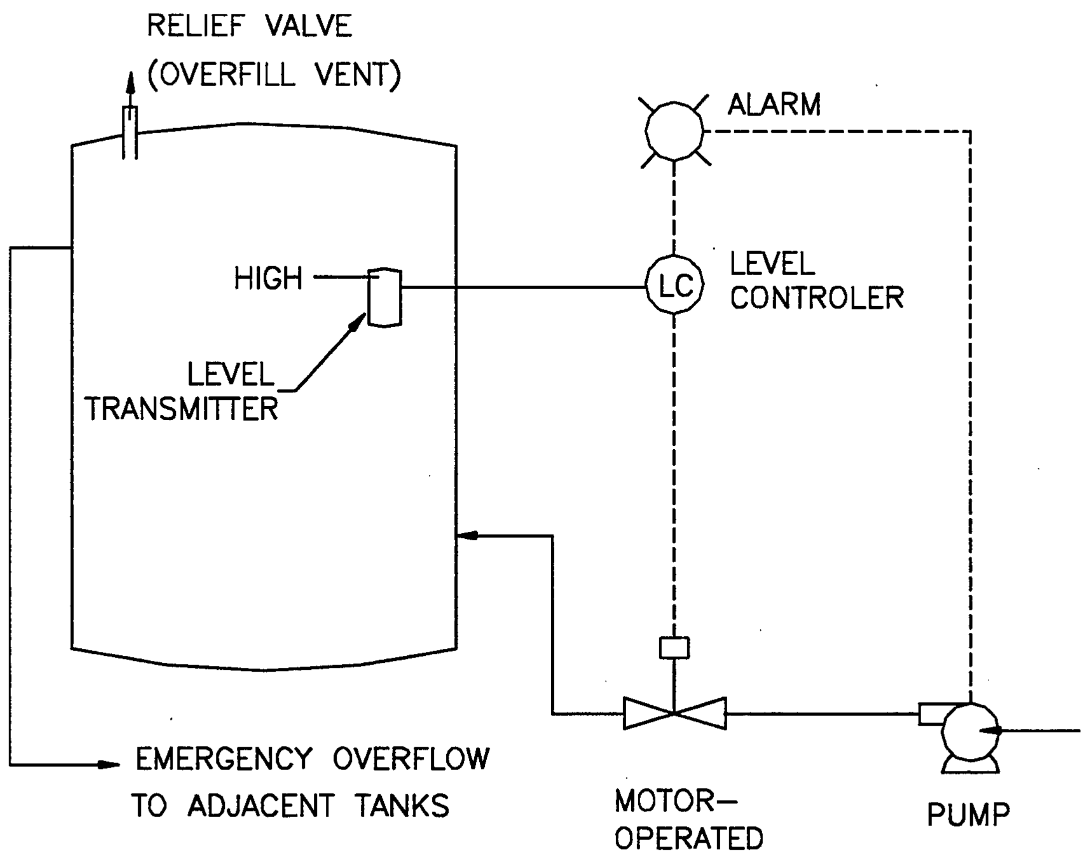
- The steam return or exhaust lines from internal heating coils which discharge into an open water course should be monitored for contamination or passed through a settling tank, skimmer, or other retention system.

- The feasibility of installing an external heating system should also be considered.

4.2.7. Level Controls

Tank level controls or detection devices use level sensors and gauges to detect and indicate the liquid level in a tank. They may be used by themselves, connected to audio and/or visual high-level alarms that warn an operator of potential overfill conditions, or interlocked to electronic or mechanical devices that automatically shut down filling operations. Figure 4-9 shows a generalized schematic of an overfill protection system.

40 CFR 112.7(e)(2)(viii) requires new and old oil tank installations to be fail-safe engineered or updated to avoid spills. This includes installation of liquid level sensing devices, high-level alarms, automatic pump cutoff devices, and other automatic controls. NFPA 30 also requires overfill protection of ASTs storing flammable and combustible liquids by utilizing high-level detection devices and automatic controls to shut down or divert flow. Double-walled aboveground tanks are required to have an overfill alarm and a high-level shutoff device by EPA and NFPA Code 30. In addition to the high-level alarm and automatic shutoff device, NPFA Code 30 requires a liquid-level indicating device for double-walled ASTs. The code also states that USTs be equipped with an automatic system to shut down flow when the tank is 95% full or alert the operator when the tank is more than 90% full. Some state and local agencies may also require continuous level sensing equipment as a means of leak detection for the tanks. In addition, level gauging devices and high- and low-level alarms are required for all oil storage tanks by DM-22.



Adapted from Technology for the Storage of Hazardous Liquids; A State-of-the-Art Review, New York State Department of Envirnomental Conservation, 1983.

Figure 4-9
Elements Of Ideal Overfill Prevention System

Types of level sensing devices include float-actuated devices, displacement systems, electrical capacitance sensors, optical sensors, ultrasonic sensors, thermal conductivity sensors, and pressure sensors. Table 4-6 shows the characteristics of level sensing devices available for aboveground and underground storage tanks and the types of gauges, alarms, and automatic controls that can be applied.

If only high- and low-level conditions need to be monitored rather than a continuous measurement of liquid level, a conductive or capacitance-type probe may be appropriate. However, the type of product being measured must also be considered. For example, conductive level gages (both point probes and continuous measurement) are not effective with fuels such as JP-4 due to low conductance. A mechanical device or capacitance-type gage is more appropriate. Mechanical devices tend to be more reliable and require less maintenance than electrical devices.

Table 4-6
Liquid Level Sensing Devices

Type of Device	Applicability	Level Indication	Alarm and Shutoff Response
Float Actuated Devices			
Chain float gauges	A	Gauge	Interfaces with electronic or pneumatic controls
Tape float gauges	A&U	Gauge	Interfaces with electronic or pneumatic controls
Float vent valves	U	None	Automatic shutoff
Drop tube float valve	A&U	None	Automatic shutoff
Lever and shaft mechanisms	A	Gauge	Interfaces with electronic mechanisms or pneumatic controls
Magnetically coupled floats	A	Gauge	Interfaces with electronic floats or pneumatic controls
Displacer Devices			
Torque tube displacer	A	Gauge	Mechanical
Magnetically coupled displacers	A	Gauge	Mechanical displacers
Flexure-tube displacer	A	Gauge	Interfaces with electronic nor pneumatic controls
Pressure Devices			
Pressure gauge - open vessel	A	Gauge	Interfaces with electronic vessel or pneumatic controls
Bubble-type systems (gas bubblers)	A	Gauge	Interfaces with electronic{gas bubblers or pneumatic controls
Head systems on pressurized tanks	A	Gauge	Interfaces with electronic pressurized tanks or pneumatic controls
Capacitance Devices	A&U	Gauge	Audible alarm and automatic shutoff; electronic controls
Thermal Conductivity Devices	A&U	Gauge	Audible alarm and automatic Devices shutoff; electronic controls
Ultrasonic Devices	A&U	Gauge	Audible alarm and automatic shutoff; electronic controls
Optical Devices	A&U	Gauge	Audible alarm and automatic shutoff; electronic controls

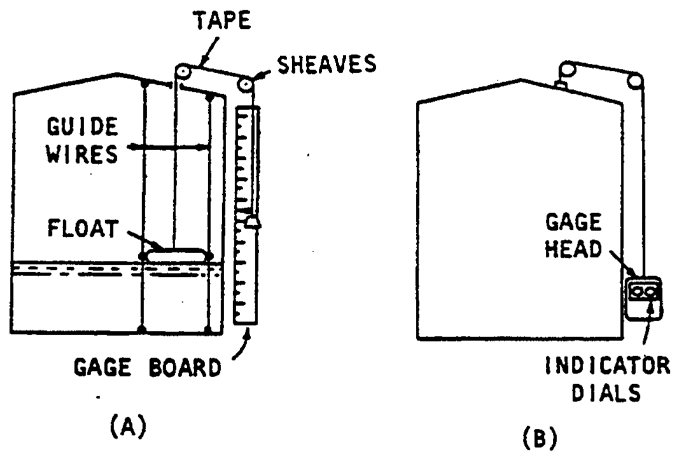
A = Aboveground tanks

U = Underground tanks

4.2.7.1. Float-actuated Devices.

Float-actuated devices are characterized by a buoyant member which floats at the surface of the liquid. The float is typically made of a material such as aluminum, stainless steel, or coated steel. This level-sensing device may be used in conjunction with pneumatic or electronic devices to operate valves, pumps, remote alarms, or automatic shutoff systems. Float-actuated devices are classified by the method used to couple the float motion to the indicating system. Examples of classifications include tape float gauges, chain float gauges, float vent valves, lever and shaft float gauges, and magnetically coupled float gauges.

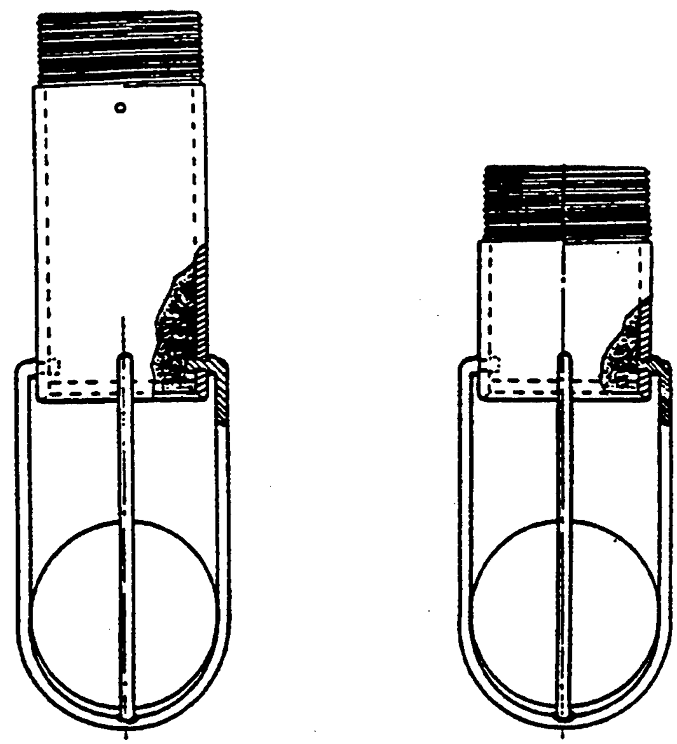
Tape and Chain Float Gauges. Chain or tape float gauges consist of a float mechanically connected by a tape or a chain to a board or indicator dial as shown in Figure 4-10. They are commonly used in large atmospheric storage tanks due to low cost and reliability. Their disadvantages include the potential for (1) misalignment of the float or the tape; (2) corrosion of the float material when improperly selected; and (3) jamming and freezing of the float linkage.



Source: Technology for the Storage of Hazardous Liquids: A State-of-the-Art Review, New York State Department of Environmental Conservation, 1983.

Figure 4-10
Chain And Tape Float Gauges Used For Tank Level Control

Float Vent Valves. Float vent valves are simple, inexpensive devices used to prevent overfilling of underground fuel tanks. These devices, which are shown in Figure 4-11, are installed in the tank's vent line. When a high level is attained, the float closes the vent line, thus blocking the escape of air. This action causes the pressures inside the storage tank to equalize with the discharge head in the tank truck, thereby interrupting the flow of liquid.



Source: OPW Division/Dover Corporation.

Figure 4-11
Float Vent Valves

The float vent valve also includes a pressure relief hole. Once flow from the tank truck has ceased due to pressure equalization, the fill line is disconnected. Then, as vapor escapes through the float vent valve relief hole, the liquid remaining in the fill line drains into the tank.

If dry disconnection couples are used, the liquid will be held in the transfer line, thus preventing any spillage of product.

Drop Tube Float Valve. Drop tube float valves are two-stage shut-off valves, as shown in Figure 4-12.

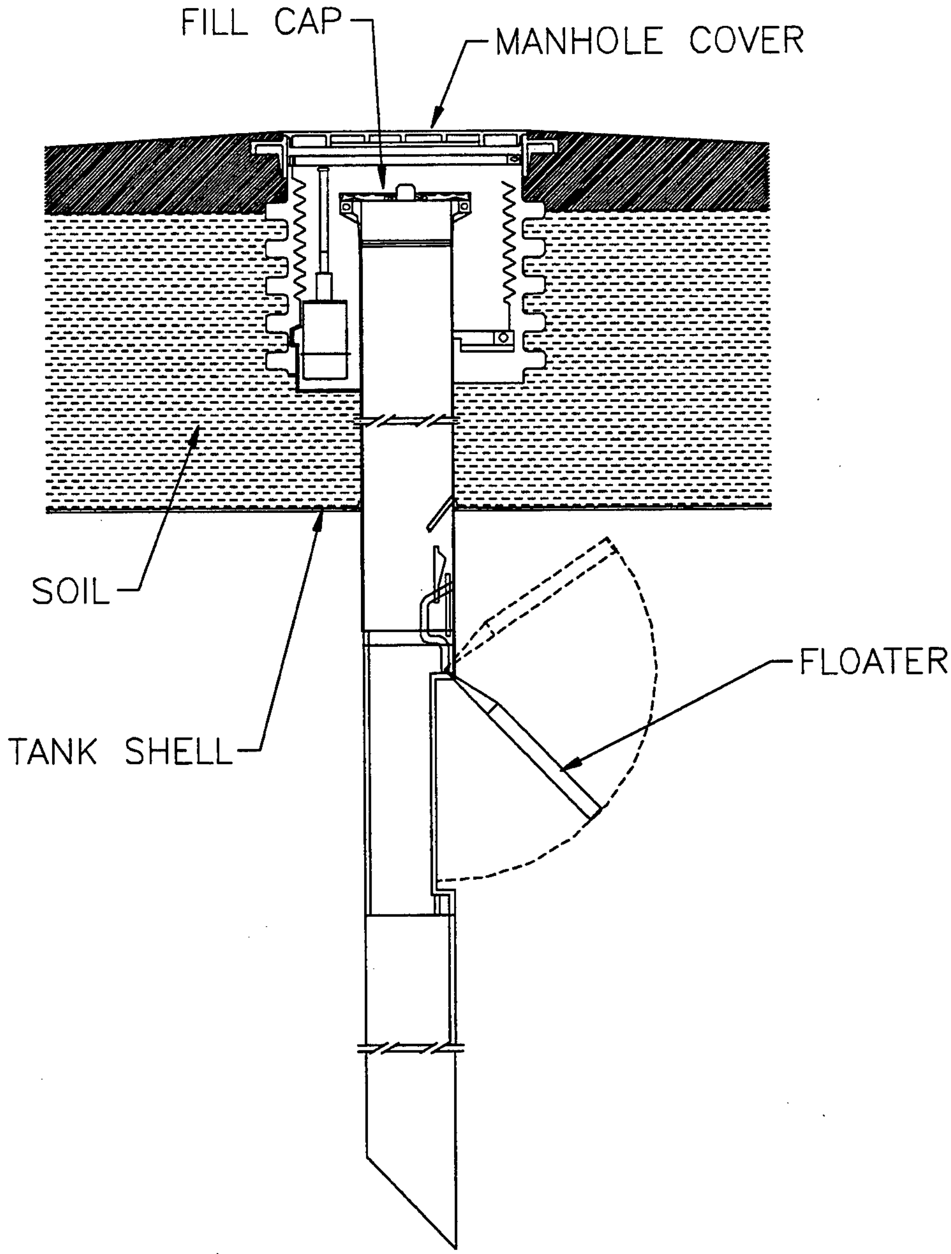
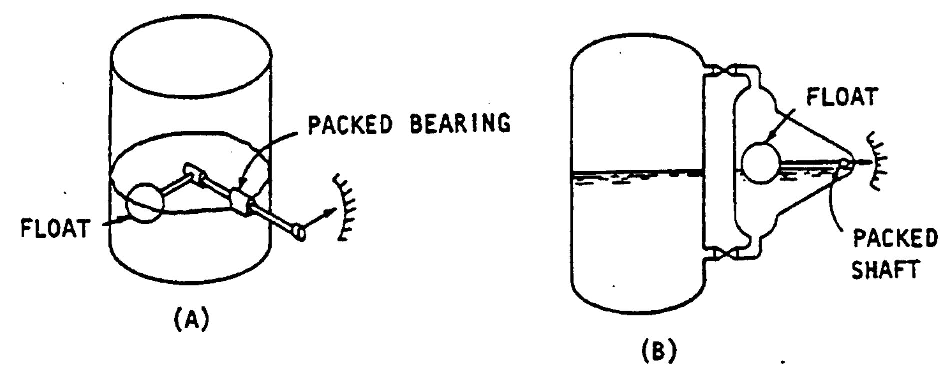


Figure 4-12
Drop Tube Float Valve

The valve mechanism releases and closes automatically when the liquid level rises to about 95% of tank capacity. This reduces the flow rate through a bypass valve. The operator may then stop filling the tank, disconnect and drain the hose. If the liquid rises

to about 98% of tank capacity, indicating an unsafe condition of overfilling, the bypass valve closes. No more liquid will be allowed into the tank until the level drops below a set point.

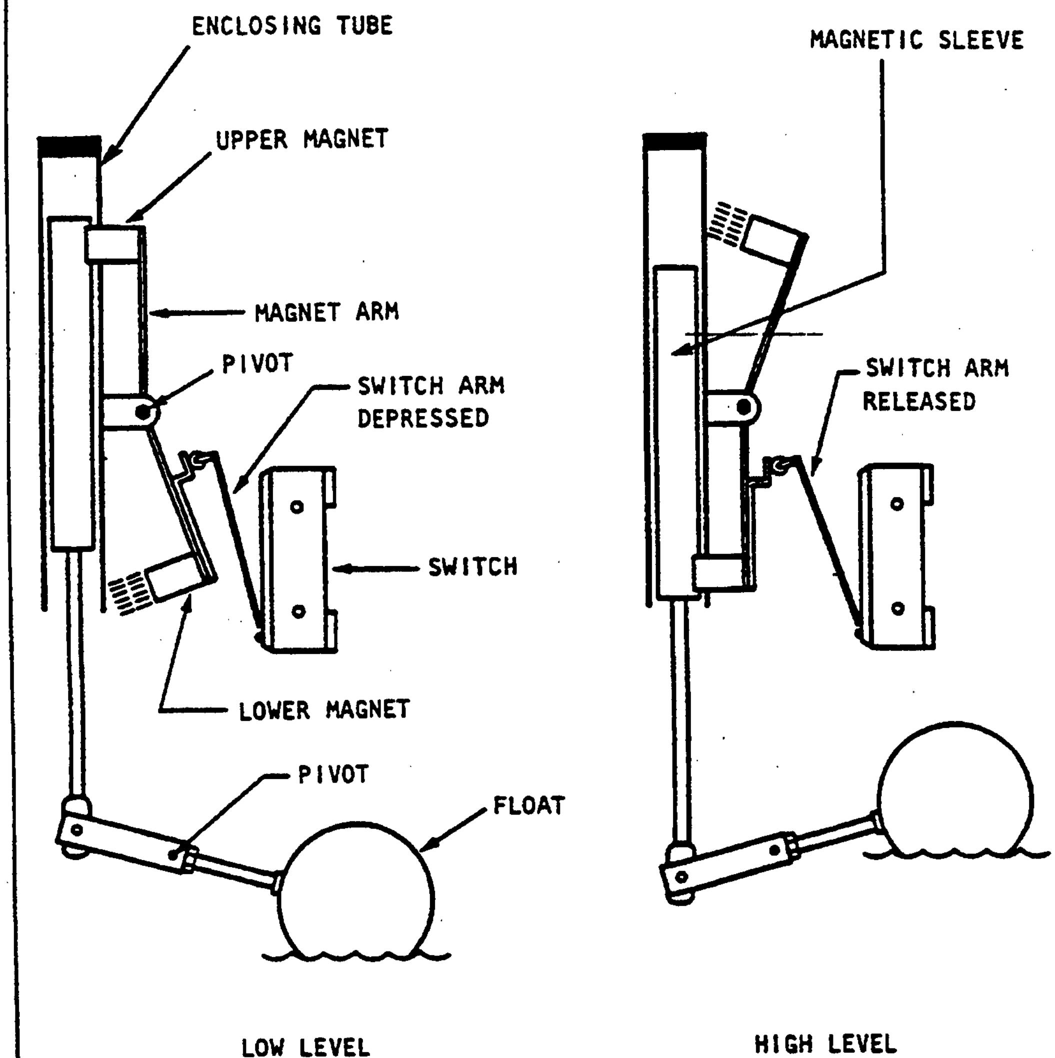
Lever and Shaft Float Gauges. Lever and shaft float gauges consist of a hollow metal sphere, sometimes filled with polyurethane foam, and a lever attached to a rotary shaft that transmits the float motion to the outside of the vessel through a rotary seal as indicated in Figure 4-13. These devices are applicable for atmospheric as well as pressurized tanks.



Source: Technology for the Storage of Hazardous Liquids: A State-of-the-Art Review, New York State Department of Environmental Conservation, 1983.

Figure 4-13
Lever and Shaft Float Gauge

Magnetically Coupled Float Gauges. Magnetically coupled float gauges consist of a permanent magnet attached to a pivoted switch as shown in Figure 4-14. As the float rises, following the liquid level, it raises a magnet attractor into the field of the magnet, which in turn snaps against the non-magnetic barrier tube to tilt a switch. When the liquid level falls, the float draws the magnet attractor below the magnetic field. The magnet swings out and tilts the switch to the reverse position, causing actuation of the low-level switch. The float and guide tube that come in contact with the measured liquid are available in a variety of materials for resistance to corrosion and chemical attack. Magnetically coupled float gauges may be used in conjunction with pneumatic and electronic controls to operate pumps, valves, alarms, and other external systems.



Source: Technology for the Storage of Hazardous Liquids: A State-of-the-Art Review, New York State Department of Environmental Conservation, 1983.

Figure 4-14
Magnetically Coupled Float Gauge

4.2.7.2. Displacer Systems.

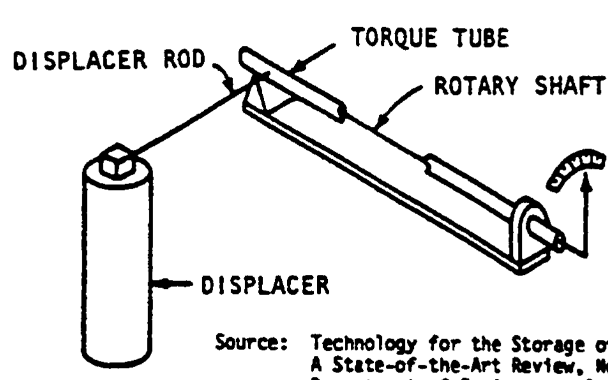
Displacer-actuated devices use the buoyant force of a partially submerged float or displacer as a measure of liquid level. The vertical motion of the displacer is directly proportional to the buoyant force, which correlates to the level of the liquid. Accurate

level measurement with displacement devices is a function of the liquid and vapor densities. Displacer devices can be used in top cage mountings or side mountings in aboveground tanks (atmospheric, pressurized, or vacuum tanks). The following are several types of displacer-actuated level sensing devices.

Torque Tube Displacer. Figure 4-15 depicts a torque tube displacer, which is one of the most frequently used level-measuring devices. The displacer is suspended on a rod attached to a torque tube. This is fixed at its outer end and supported on a knife-edge bearing at its inner end. The torque tube, in addition to being the elastic member, also constitutes a packless, pressure-tight barrier. Inside the torque tube is a shaft fixed to the torque tube at its inner end. The rotation of the outer end of the shaft through a range of 5 to 10 degrees is proportional to the buoyant force exerted on the displacer by the stored liquid.

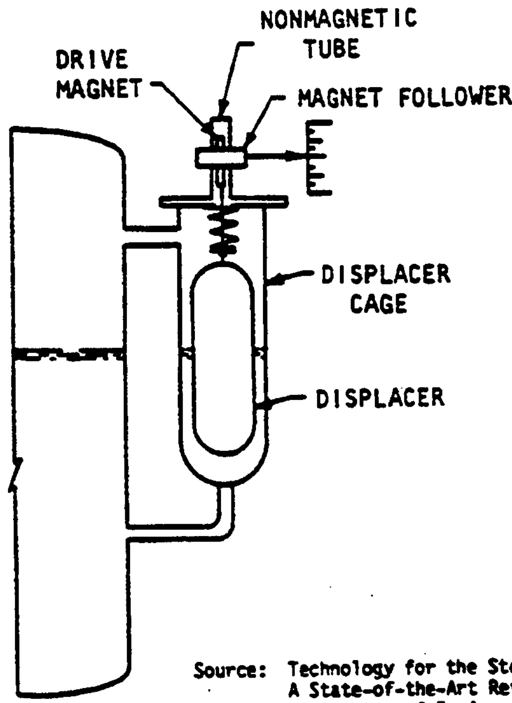
Magnetically Coupled Displacer. The magnetically coupled displacer, illustrated in Figure 4-16, is constrained by a spring and moves a drive magnet enclosed in a protecting tube. Motion of the drive magnet is transmitted to the indicating mechanism by a magnetic follower outside the protecting tube. Devices of this type are almost always mounted in external displacer cages and require two tank connections, one above and one below the liquid level. The magnetically coupled displacers are compatible with both pneumatic and electronic controls.

Flexure Tube Displacer. The flexure tube displacer, as shown in Figure 4-17, is a comparatively simple displacer device. It consists of an elliptical or cylindrical float mounted on a short arm. The arm is connected to the free end of a flexible tube; the fixed end is attached to a mounting flange. Motion of the float end of the tube is transmitted outside the float chamber by means of a rod extending through the tube. These devices are side-mounted and are commonly used to activate either an electrical level switch or a pneumatic pilot.



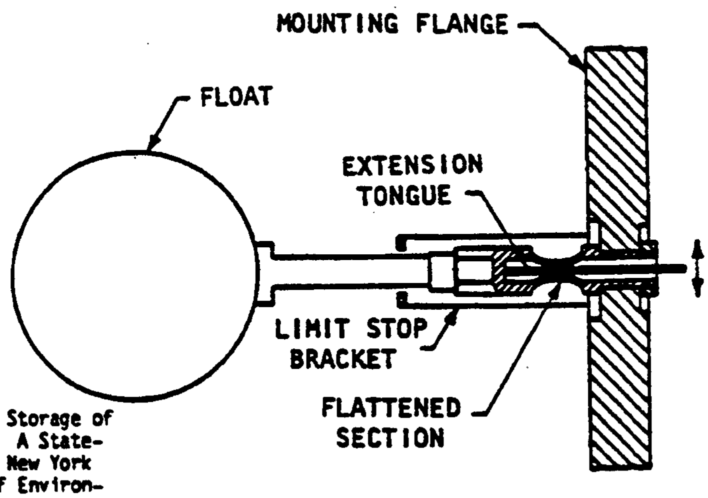
Source: Technology for the Storage of Hazardous Liquids: A State-of-the-Art Review, New York State Department of Environmental Conservation, 1983.

Figure 4-15
Torque Tube Displacer



Source: Technology for the Storage of Hazardous Liquids: A State-of-the-Art Review, New York State Department of Environmental Conservation, 1983.

Figure 4-16
Magnetically Coupled Displacer



Source: Technology for the Storage of Hazardous Liquids: A State-of-the-Art Review, New York State Department of Environmental Conservation, 1983.

Figure 4-17
Flexure Tube Displacer

4.2.7.3. Hydrostatic Head (Pressure) Devices.

A variety of devices utilize hydrostatic head as a measure of level in aboveground tanks. As in displacer devices, accurate level measurement by hydrostatic head is a function of the densities of both the liquid and the vapor-air mixture inside the tank. Therefore, the tank should be used to store the type of product for which it was designed. The majority of these types of level sensing devices use standard pressure or differential pressure measuring devices. They are compatible with either pneumatic or electronic controls. The following are examples of hydrostatic head level sensing devices.

Open-Vessel Pressure Gauge System. The pressure gauge system on open vessels is the simplest application of head level measurement. The pressure-measuring element is located at or below the minimum operating level in the tank. Pressure piping between the vessel and the measuring element must be sloped upward toward the vessel to prevent errors due to entrapped air or other gases. A drain valve at the measuring element allows sediment to be flushed from the piping. These types of level sensing devices are compatible with both pneumatic and electronic controls, although electropneumatic converters may be required when electronic controls are used.

Bubble Tube System. Bubble tube systems consist of a tube inserted in the tank through which an air stream is maintained. The pressure required to keep the liquid out of the tube is proportional to the liquid level in the tank. The higher the liquid level, the higher the air pressure must be to keep the tube evacuated. A flow regulator maintains a constant supply of air into the tube. A pressure indicator is located downstream of the flow regulator to measure the liquid level by measuring the pressure head exerted by the liquid. Bubble tube systems are particularly applicable to corrosive and viscous liquids, liquids subject to freezing, and liquids containing entrained solids. They are generally used in conjunction with pneumatic controls if electropneumatic converters are provided. Bubble tube systems are usually more expensive than float or displacer systems, since they require a constant supply of clean and dry instrument air. This system is shown in Figure 4-18.

Pressurized Tank System. Head systems on pressurized tanks measure liquid level by means of hydrostatic head; this system differs from the system in open vessels in that a differential pressure measurement is made. Applications of this technique may employ almost any of the conventional differential pressure measuring devices.

Careful attention to the details of the installation is important. The density and vapor pressure of the liquid must be known; therefore, the tank should store the product for which it was designed. Hydrostatic heads that are not pertinent to the desired measurement must be compensated for or eliminated. The level above the lower tank connection is measured by the differential pressure across the measuring element. This measurement is accurate only if the following conditions are met: (1) compensation is made for any deviation in the density of the liquid; (2) the connection to the low-pressure side of the measuring element contains no liquid that has accumulated due to

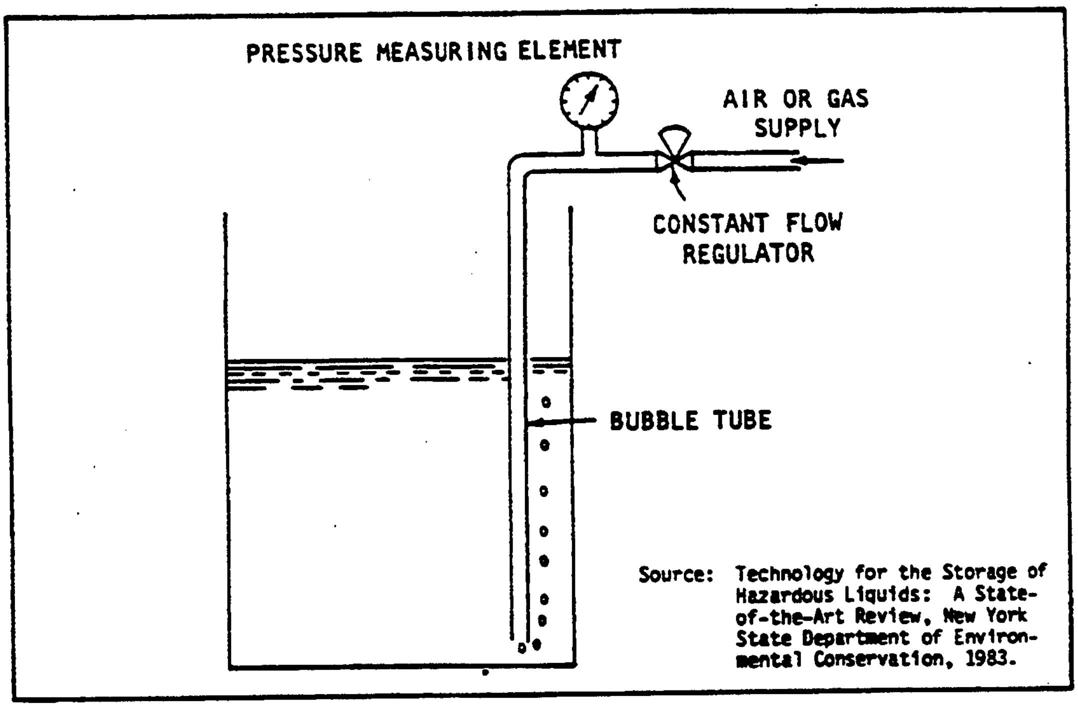


Figure 4-18
Bubble Tube System

overflow or condensation; (3) the density of the air-vapor mixture above the liquid is either negligible or compensated for; and (4) the measuring element is located at the same elevation as the minimum level to be measured, or suitable compensation is made. Either pneumatic or electronic controls may be used with these devices.

4.2.7.4. Capacitance Sensors.

Capacitance sensors measure the difference in capacitance between the liquid product and its vapor to monitor liquid level. A typical device consists of a rod electrode positioned vertically in a vessel; the other electrode is usually the metallic tank wall. The electrical capacitance between the electrodes is a measure of the height of the interface along the rod electrode. The rod is usually electrically insulated from the liquid in the tank by a coating of plastic.

Capacitance devices are used in conjunction with electronic controls to operate pumps, valves, alarms, or other external control systems.

4.2.7.5. Thermal Conductivity Sensors.

Thermal conductivity sensors measure the difference between the thermal conductivity of the stored liquid and its vapor to monitor liquid levels. A typical device consists of two temperature controlled, temperature sensitive probes connected in a Wheatstone bridge (a type of electrical circuit configuration). When the probes are in air or gas, a maximum temperature differential exists between the active and reference

sensors, which results in a great imbalance in the bridge circuit and a correspondingly high bridge voltage. When the probes are submerged in a liquid, the temperature between the sensors is equalized and the bridge is brought more closely into balance. The probes may be installed through the sidewall of a tank or pipe, or assembled together on a self-supporting mounting and suspended through a top connection on the tank.

Thermal conductivity devices may be used to control level with great accuracy. They may be used with any liquid, regardless of viscosity or density. They may also be used in conjunction with electronic controls to operate pumps, valves, alarms, or other external control systems.

4.2.7.6. Ultrasonic Sensors.

Ultrasonic sensors use sonic-wave propagation in fluids to monitor liquid level. These devices use a piezoelectric transmitter and receiver, separated by a short gap. When the gap is filled with liquid, ultrasonic energy is transmitted across the gap to a receiving element, thereby indicating the liquid level. These devices may be used in conjunction with electronic controls to operate pumps, valves, alarms, or other external control systems.

Another sonic technique used for level measurement is a sonar device. A pulsed sound wave, generated by a transmitting element, is reflected from the interface between the liquid and the vapor-gas mixture and returned to the receiver element. The level is measured in terms of the time required for the sound pulse to travel from the transmitter to the vapor/liquid interface and return.

4.2.7.7. Optical Sensors.

An optical sensor uses the refraction of a light beam in fluids to monitor liquid level. An optical liquid level monitoring system consists of sensors and an electronic control device. A specific electronic signal is generated and aimed at the tank-mounted sensors. The sensors convert the electronic signal to a light pulse. This light pulse is transmitted into the tank via fiber optics, through a prism, and out again via fiber optics. The light pulse is then converted to a specific electronic signal to indicate the liquid level. If the level is too high, the controller activates the shutoff valve or the level alarm. A distinct advantage of this type of system is that it is self-checking. Any interruption will sound the alarm, so if equipment is damaged or malfunctions, the operator is alerted.

4.2.8. Automatic Controls

In more complex situations such as large, continually fed tanks, level-sensing devices may be interlocked to electronic or mechanical devices that automatically shut down filling operations. These interlocking controls normally work by closing tank inlet valves, shutting off pumps, or diverting flow to emergency overflow tanks when a high-level condition is reached. This practice is recommended for tanks filled by pumps.

Interlocking devices reduce the possibility of human error, the primary cause of spills. The need for interlocking will depend upon tank type, size and configuration, tank inlet flow rates (i.e., gravity or pump), and secondary containment provisions. The tank parameters determine the rate at which the fluid level in the tank rises and the response time available to the operator to shut down operations when a high-level condition is reached. Interlocking devices are particularly desirable for tanks without secondary containment.

For gravity filled tanks, an automatic valve on the inlet side of the tank, which closes at the high-level condition, is recommended.

Interlocking high-level alarm and pump controls are generally less expensive and provide the same degree of protection as an interlocking high-level alarm with tank inlet valves.

Selection of automated overfill prevention systems should be based upon a careful study of the particular application, taking into account economic justification, operational, and security requirements.

4.2.8.1. High-Level Alarm

40 CFR 112.7(e)(2)(viii)(A) states that consideration should be given to high liquid level alarms with an audible or visual signal. A visual signal may be used at a constantly manned operation or surveillance station, while in smaller or unmanned areas an audible alarm may be more appropriate.

High-level alarms should be mechanically and electrically independent of the gauging device. Two alarm levels must be provided, as required in DM-22 for petroleum fuel tanks. One alarm level should be at approximately 95 percent of the safe tank filling height. The alarm should actuate an audible signal located at or near the person controlling the operation. The second alarm should be set at approximately 98 percent of the safe filling height. It should continue the audible alarm, actuate a visual alarm, and close an electrically-actuated valve to stop the flow or to stop product supply pumps if they are controlled solely from within the terminal.

4.2.8.2. Direct Gauger/Pumping Station Communication

Direct audible or code signal communication between the tank gauger and the pumping station are also to be considered according to 40 CFR 112.7(e)(2)(viii)(C). This control arrangement requires the least hardware, but is the most labor intensive. The tank gauger is stationed near the tank being loaded, while the pumper would be at the pump cutoff switch. The tank gauger uses a gauge or alarm to monitor the liquid level and then signals to the pumper to stop pumping.

4.2.8.3. Pump Cutoff Devices

Pump cutoff devices stop flow at a predetermined tank product level. A pump cut-off system is a function of tank size, tank configuration, inlet flow rates, and response time of an operator or inlet motor control valve to stop the flow.

Pump cutoff devices are interlocking devices between tank high-level alarms and the inlet control valves and/or pumps. They are most appropriate at areas without secondary containment.

The high-level alarm is interlocked with the pump and the inlet control valve. This arrangement provides an immediate shutoff of flow to the tank. However, interlocking the tank high-level alarm and the pump controls only is generally less expensive and can provide the same degree of protection. In this case, however, the high-level alarm position must be set low enough to prevent tank overfill due to a short period of continued pump operation.

4.2.8.4. Other Automatic Control Considerations

For pumping areas (non-gravity loading or unloading operations), a positive means should be provided for emergency shutoff of fuel transfer operations. This is especially crucial for tanker truck or tanker car loading operations, where the product is coming from storage to a mobile delivery vehicle.

Options for emergency shutoff include: (1) installing a butterfly or ball valve at the product transfer point which can be accessed and closed in an emergency; (2) automatic, electrically controlled shutoff valves which can be actuated by an emergency control switch; or (3) an emergency pump stop switch at the loading or unloading point. Butterfly or ball valves should be used for emergency shutoff valves; gate valves take longer to close. However, a mechanical engineer or hydraulic engineer should perform a hydraulic analysis of the piping system prior to installing quick-closing valves to determine the impact of hydraulic surges on the system.

Electrically operated valves are expensive and should be used only where environmental conditions warrant such protection or where the valve is located far from the loading/unloading area. A product transfer line will need to be removed from service for up to a week to complete the retrofit process.

4.2.9. Secondary Containment

Bulk oil storage tank installations are required under SPCC regulations, 40 CFR 112.7(e)(2)(ii), to have a secondary means of containment for the entire contents of the largest single tank plus sufficient freeboard to allow for precipitation. Where experience indicates a reasonable potential for equipment failure, 40 CFR 112.7(c) requires appropriate containment and/or diversionary structures or equipment to prevent discharged oil from reaching a navigable water course.

The April 29, 1992 EPA memorandum (Appendix K) states that in order for double walled aboveground tanks to provide substantially equivalent protection of navigable waters, they must meet the secondary containment requirement listed in 40 CFR 112.7(c) or:

- individual tanks must have capacities less than 12,000 gallons
- inner tank constructed of Underwriters' Laboratory-listed steel tank

- outer wall constructed in accordance with nationally accepted industry standards
- tank has overfill prevention measures that include an overfill alarm and an automatic flow restrictor or flow shut-off
- constant monitoring of all product transfers
- manifolded tanks or other piping arrangements that would permit a volume of oil greater than the capacity of one tank to be spilled as a result of a single system failure must have a combined capacity less than 40,000 gallons

The use of vaulted tanks does not exempt the requirements of secondary containment. A vaulted tank is considered secondarily contained if no oil is capable of leaving the vault.

Secondary containment is required of USTs if they contain hazardous substances or a mixture of hazardous substances and petroleum, but is not required for USTs containing only petroleum. However, it is important to note that certain states, such as California, require USTs to have secondary containment.

Secondary containment is also required under RCRA (40 CFR 264.193) for new hazardous waste storage tanks and ancillary equipment. For existing hazardous waste tank systems (40 CFR 264.191), if the age of the tanks is known, it was required to have secondary containment by January 12, 1989, or before the tank is 15 years old. If the age of the tank is unknown, it was required to have secondary containment by January 12, 1992; however, if it is over seven years old, it must have secondary containment before it is 15 years old. Requirements for spill control structures and drainage systems are addressed in Chapters 7 and 8 of this manual, respectively.

All hazardous waste container storage areas, where liquid wastes and certain non-liquid wastes (specified in 40 CFR 264.175(d)) are stored, are required by 40 CFR 264.175 to have secondary containment. The secondary containment must have sufficient capacity to contain 10% of the volume of containers or the volume of the largest container, whichever is greater.

NFPA 30 states that ASTs storing flammable and combustible liquids shall have secondary containment such as remote impounding or impounding around the tank using a dike or curb to prevent accidental discharge. NFPA 30 allows for an exception with double-walled ASTs less than 12,000 gallons in capacity. This exception is subject to meeting the requirements stated under 2-3.4.1 of this code.

There are no national regulatory requirements for secondary containment for HS storage other than what is specified above. However, it is considered a best management practice to have secondary containment for all HS storage areas. State and local regulatory requirements should be checked for additional HS storage requirements.

4.2.10.Tank System Testing

Integrity or nondestructive testing is the testing of a tank system through applied measuring methods without the tank being altered, modified, or disassembled. Regular testing can prevent leaks or detect them in early stages. Testing is also used on components of tank systems, such as corrosion protection systems, to verify proper operational status.

40 CFR 112.7(e)(2)(vi) states that aboveground tanks should be subjected to periodic integrity testing, using such techniques as hydrostatic testing, visual inspection, or non-destructive shell thickness testing. Comparison records should be kept. Tanks should be inspected for such things as tank supports, foundations, exterior corrosion, leaks, and accumulation of oil inside diked areas.

To prevent underground tank leaks, 40 CFR 112.7(e)(2)(iv) states that underground metallic oil tank areas should be subjected to regular pressure testing. 40 CFR 280 also places stringent requirements for owners to test or monitor their USTs. 40 CFR 280.21(b)(1)(ii) requires that interior inspections of tanks which were retrofitted with interior liners be conducted every 5 years. Tanks upgraded by cathodic protection may require integrity testing in accordance with 40 CFR 280.21(b)(2). Corrosion protection systems must be inspected in accordance with 40 CFR 280.31. 40 CFR 280.33 requires tightness testing after repairs of tanks and piping. Additional, specific testing requirements may be required by 40 CFR 280. The applicability of 40 CFR 280 to any specific UST should be fully assessed by a qualified professional.

Integrity testing is required for all RCRA-regulated HW tanks without secondary containment. Testing is required at one-year intervals for non-enterable underground tanks and ancillary equipment (40 CFR 264.193(i)). For other than non-enterable underground tanks, a leak test must be conducted or a scheduled assessment of tank integrity must be implemented. The frequency of these assessments must be based on the material of construction of the tank and its ancillary equipment, the age of the system, the type of corrosion or erosion protection used, the rate of corrosion or erosion observed during the previous inspection, and the characteristics of the waste being stored or treated. For ancillary equipment, a leak test or other integrity assessment must be conducted at least annually.

NFPA 30 requires that all tanks used to store flammable and combustible liquid be maintained liquid-tight. Leaking tanks have to be emptied, repaired, and tested in a manner approved by the local authority having jurisdiction.

A number of testing methods exist, each with its particular application and limitations. Although most methods can be applied to both aboveground and underground systems, the method used for a particular application will depend upon the accessibility of the equipment to be tested, method reliability and adaptability, and above all, practicality, and cost. Common methods used for aboveground and underground tanks and pipelines are presented below.

Although this section discusses tank testing, it should also be noted that other tank system components including leak detectors and alarms, level sensing devices, level

alarms, emergency shutdown switches, and other automatic controls must be operationally tested in accordance with the manufacturer's instructions.

4.2.10.1. Aboveground Tank Testing

Non-Destructive Shell Thickness Tests.

The following are several methods of testing storage tanks for shell thickness. The methods discussed below are preferred over common pressure testing methods, since they are easy to apply to exposed areas and do not expose tanks to potentially damaging pressures.

<u>Acoustic Emissions</u>. Acoustic emissions tests use piezoelectric transducers to monitor or "listen to" the acoustic emissions generated by flaws when the system is placed under certain stress conditions. These sounds are recorded and related to the basic material characteristics to determine the relative stability of the equipment being tested. Acoustic emissions tests can be used to determine tank wall thickness, flaws, leaks, and corrosion.

<u>Eddy Currents</u>. Eddy currents are electrical currents induced within the body of a conductor when the conductor moves through a non-uniform magnetic field or is in a region where there is a change in magnetic flux. In the eddy current test, a test coil indicates defects within the tank shell. The method is effective for spot checks of surface and subsurface cracks, wall thickness, and coating thickness.

<u>Hammering.</u> Hammering is a simple and effective method that relies on sound, vibration, denting, and movement to detect defects and flaws in the tank and also reduced wall thickness. This method requires an experienced inspector to be effective. Care must be taken to prevent damaging weak areas or coatings, particularly when testing in-service equipment. For this reason, more accurate, stressless methods, such as radiography or ultrasonics, are recommended for determining wall thickness in areas around a leak or suspected to be extremely thin. Hammering can damage the following:

- Enameled, ceramic, or glass-lined pieces, where the lining may be injured.
- Brittle materials, such as cast iron, some high-steel alloys and nonferrous materials such as brass and bronze. Light tapping with a hammer may be permissible on some of these materials.
- Other locations where hammering might result in stress corrosion or cracking, such as equipment in caustic service.

Non-Destructive Surface Damage Tests.

<u>Magnetic (Dry) Particle.</u> Magnetic particle inspection is used to detect surface cracks or flaws. Fine magnetic particles are applied to a magnetized surface and are attracted to regions of magnetic non-uniformity associated with cracks or discontinuities. The tank inspector can visually observe patterns which are indicative of tank flaws. The testing equipment is portable and well suited to fieldwork, and is applicable to large surface areas, such as tank shells.

Magnetic (Wet) Particle. The wet particle testing method is similar in principle to the dry particle testing method. It is less sensitive than the dry method in the detection of fine surface discontinuities, but more sensitive in detecting near-surface discontinuities. The wet method is adaptable to irregular, relatively small surface areas such as valves.

Penetrating Dye. The penetrating dye method involves applying a liquid which will seep into any surface cracks or discontinuities through capillary action. After the surface is wiped dry, a developer is applied to the surface and becomes tainted by the original liquid as it seeps out of the cracks, delineating the cracks or discontinuities in the surface. The method is effective on non-porous metallic materials, both ferrous and nonferrous, and on non-porous, nonmetallic materials such as ceramics, plastics, and glass.

Radiographic. Radiographic testing uses X-rays, nuclear radiation, or both to detect subsurface discontinuities in solid materials, and presents their images on a recording medium (film), known as a radiograph. Any flaws detected by the test will appear as darkened areas in the shape of the flaw against the uniformly lighter background of the intact area. Radiography may also be used for determining wall thickness, product buildup, blockage, and the condition of internal equipment such as trays, and valve parts. Radiography can only be conducted by qualified radiographers. In addition, training and experience are required to interpret the images produced on the radiographic film correctly.

Spark Testing. High-voltage, low-current electrical spark tests are performed by passing an electrode over a non-conducting material, such as a tank lining or coating. The other end of the circuit is attached to the conductive wall. Any defects will cause an electrical arc to pass through at the point of the defect. Care must be taken not to exceed the dielectric constant, or damage to the lining may result.

Ultrasonic Testing. Ultrasonic testing detects subsurface discontinuities from the interruptions they cause in pulse or resonant vibrations transmitted through the metal until they reach a reflecting surface, which returns the waves. The time interval required for the waves to complete this "round trip" indicates the metal thickness from a fraction of an inch to several feet. Ultrasonic instruments can also be used to measure the tank's thickness and determine the location, size, and nature of defects. Most importantly, ultrasonic testing can be performed while the tank is in operation as only the outside of the tank needs to be contacted.

Vacuum Box. In this method, also called soaping, the lips of the open side of the vacuum box are covered with a sponge rubber gasket. The bottom of the box is made of glass. A vacuum gauge and air siphon connection are installed inside the box. The seam of the tank shell is first wetted with a soap solution, then the vacuum box is pressed tightly over the seam. The foam-rubber gasket forms a seal that allows a vacuum to build up inside the box by air siphon. If any leak exists, soap bubbles will form inside the box and can be seen through the glass.

4.2.10.2. Underground Tank Testing

Pressure Testing

Pressure testing methods are usually performed for underground systems because they do not require uncovering and exposing the tank. Uncovering and exposing a tank is costly, time-consuming, and can very easily cause a leak that did not previously exist. Pressure testing methods consist of filling a tank system with a fluid (usually water) or air, until a certain pressure is reached, and observing if a loss of the fluid or pressure occurs. Drawbacks with these methods include:

- Excessive pressures can rupture a tank or indicate leaks where none exist if non-representative liquids (i.e. different density than product stored) are used. Therefore, the method and liquid used should duplicate normal conditions as close as possible.
- Methods lose accuracy for tanks of 20,000 gal capacity or more, since undetectable product level changes (hundredths of an inch), represent large volume losses.
- Corrections for substance-specific volume and temperature variations are required. Some methods do not compensate for this variation. Also, correction factors are not available for many chemicals and usually they must be determined in the field.
- Methods require a relatively constant temperature over the test period. Even results from applications where small temperature changes occur over a 24-hour period are not reliable.

The tank tightness testing discussed in Section 4.2.12 is now commonly used in lieu of pressure testing for tanks, but not for piping. Although 40 CFR 112 stipulates pressure testing, most EPA Regions will accept the use of the generally more accurate tank tightness testing methods developed for use on USTs. Pressure testing is now usually done only prior to installation of a new tank and is not commonly used on existing in-service tanks.

Some of the most common underground tank testing methods are discussed below.

<u>Hydrostatic (water or another liquid) Pressure Tests</u> are relatively simple tests which can quickly indicate a leak. If the pressure drops, it indicates the possibility of a leak, and it is recommended that a volumetric tightness test be performed. A loss of liquid pressure can be attributed to the following: a leak, a decrease in liquid temperature, distortion due to the pressure, or trapped vapor.

<u>The Pneumatic (air) Pressure Test</u> is not recommended for tanks because of many drawbacks: it is not sensitive enough to detect small leaks; it is extremely hazardous to perform especially for tanks storing flammable or combustible liquids (explosions have resulted in death), large amount of product may be forced out of the system undetected; it may cause leaks due to over pressurization; and it will not compensate for thermal expansion or contraction. NFPA 329 states that pressure tests for tanks

containing flammable or combustible liquids should be done with inert gases instead of air. Section 4-4.4.2 of NFPA 329 states that the pressure exerted by both the product and inert gas must not exceed the limits recommended by the tank manufacturer and the use of pressure-limiting devices is required in this application.

Air testing is acceptable for new tanks that have not yet been in use to store flammable or combustible liquids or vapors. New tanks and piping systems are routinely tested using air before being placed into service. Underground systems are generally tested before they are buried. When air testing is done, all joints and seams should be sprayed with a soap solution. Leaks can be detected by inspecting these joints and seams for soap bubbles during the test. This is one of the best ways to determine the location of a leak. The test can still be dangerous if done incorrectly and the accuracy of the test is limited because of thermal expansion and contraction.

<u>The J-tube Manometer Test</u> measures product level drops as small as 0.02 inches caused by tank leaks. Accuracy is proportional to the time span of the test. For instance, a 0.02 in. drop is equivalent to 2.12 gal/hr for a 1-hour test and 0.212 gal/hr for a 10-hour test. Test equipment is easy to transport, assemble, and operate, eliminates risk of tank or pipe damage due to over pressurization, and allows testing several tanks simultaneously. A drawback of this method is that it does not detect leaks above the product level. Also, temperature variations as small as 1°F during the test can void the results.

4.2.10.3. Corrosion Protection Systems

All UST cathodic protection systems must be tested within 6 months of installation and at least every 3 years as required under 40 CFR 280.31. 40 CFR 112.7(e)(7) states that an area should prepare and maintain a written procedure for inspecting and testing pollution prevention equipment which includes the corrosion protection system required by the same regulation.

Corrosion field investigations fall into the following classifications:

- Visual, physical inspections of tank equipment
- Study of maintenance records
- Soil resistivity measurements
- Potential (voltage) of structure-to-soil measurements
- Cathodic protection current requirements

Additional information on corrosion protection can be found in DM-22 and MIL-HDBK-1004/10.

4.2.11.Tank Inspections

SPCC regulations (40 CFR 112.7(e)(8)) require that written inspection procedures be developed for the area, as well as maintenance or records of inspections. The

written procedures and the record of inspections are made part of the SPCC plan and maintained for a period of three years.

Leaks through the bottom of aboveground tanks are difficult to detect. Visual inspection during routine tank cleanings and strict inventory control are the best methods for detecting a leak in the bottom of an aboveground tank.

4.2.11.1. Oil Storage Tanks (40 CFR 112.7(e)(2)(vi))

A SPCC regulation, 40 CFR 112, requires visual inspections of aboveground storage tanks. This regulation does not specifically address internal tank inspections. However, tanks commonly corrode from the inside out, and signs of corrosion may not be visible until the tank fails. At a minimum, the inspection should include the following system components:

- Tanks - walls, supports, foundation, coatings, pipe connections
- Piping, pumps, valves, and fittings
- Level sensing devices
- Alarms and automatic shut-off or flow control devices
- Loading and unloading areas and operations
- Spill control structures

4.2.11.2. HW Storage Tanks Inspection Procedures (40 CFR 264.195)

Tanks used to store or treat HW must develop and follow an inspection schedule to include the following:

- At least once a day, inspect aboveground portions of the tank system for corrosion or releases of HW
- At least once a day, inspect data gathered from monitoring and leak detection equipment,
- At least once a day, inspect tank construction materials and surrounding secondary containment systems for signs of leaks (i.e., wet spots or dead vegetation)
- Regular inspections of overfill controls
- Impressed current cathodic systems must be inspected every 60 days to ensure that it is operational
- Cathodic protection system must be inspected within six months after initial installation and annually thereafter

4.2.11.3. Underground Storage Tanks Inspection Procedures (40 CFR 280)

New UST and upgraded USTs require proper inspection to ensure tank integrity prior to its installation or operation. 40CFR 280.20, 280.21, 280.31, and 280.40 lists the following inspection requirements for tank systems and components:

- New UST installations need to be inspected and certified before use.
- Repaired tanks must be internally inspected or tightness tested.
- USTs which are upgraded with an interior liner must be internally inspected within 10 years after lining, and every 5 years thereafter.
- Before upgrading a UST with a cathodic protection system, the tank is to be internally inspected and assessed to ensure that the tank is structurally sound and free of corrosion holes. Tanks less than 10 years old have additional options available.
- All cathodic protection systems must be tested within 6 months of installation (and after repair) and at least every 3 years thereafter.
- USTs with impressed current cathodic systems must be inspected every 60 days to ensure that it is operational.
- Records of cathodic system operation must be maintained to include the results of the last three inspections and the results of testing from the last two testing/inspection events.
- Release detection systems must be checked for evidence of a release at least every 30 days.

4.2.12.Leak Detection and Monitoring (40 CFR 112.7(e)(2)(vi))

40 CFR 112 requires visual inspections of the exterior of ASTs for signs of leaks. Where applicable, the discharge from internal heating coils should also be monitored for signs of leaks (i.e., tank contents mixed with heating medium).

40 CFR 280.40 requires that new and existing UST systems provide a method, or combination of methods, of release detection that can detect a release from any portion of the tank and the connected underground piping that routinely contains product. UST release detection systems must be monitored for releases at least every 30 days. Underground piping that routinely contain oil and HS must also be monitored for releases. Methods of release detection for tanks include the following (40CFR 280.43):

- Inventory control,
- Manual tank gauging,
- Tank tightness testing,
- Automatic tank gauging
- Vapor monitoring,
- Groundwater monitoring,

- Interstitial monitoring, and
- Line monitoring

Inventory Control

For leak detection purposes, 40 CFR 280.43 requires that HS or oil inventory control be performed once a month to detect a monthly release rate of at least 1.0 percent of flow-through plus 130 gallons using the following methods:

- Inventory volume measurements for material inputs, withdrawals, and amount remaining in the tank are recorded each operating day;
- The equipment used can measure the product level over the full range of the tank's height to the nearest one-eighth of an inch;
- The material inputs are reconciled with the delivery receipts by measurement of the tank inventory volume before and after delivery;
- Deliveries are made through a drop tube that extends to within one foot of tank bottom (method to reduce splashing and entrainment of liquid droplets in the vapor);
- Material dispensing is metered and recorded within the local standards for meter calibration or an accuracy of 6 cubic inches for every 5 gallons of product withdrawn; and
- Measurement of any water level at the bottom of the tank is made to the nearest one-eight of an inch at least once a month.

Manual Tank Gauging

Manual tank gauging can only be used for tanks of 2,000 gallons or less capacity. The equipment used is a gauge stick made of varnished hardwood or other non-sparking material. The stick should be long enough to reach the bottom of the tank. Level measurements must be taken at the start and end of a period of at least 36 hours during which no liquid is added to or removed from the tank. The average of two gauge readings is used for level measurement. A leak is suspected when the variations between period beginning and ending measurements exceed the weekly or month standards as presented in Table 4-7.

Table 4-7
Standards for Measurement Variations for Manual Tank Gauging

Tank Capacity	Weekly Standard (one test)	Monthly Standard (average of four tests)
550 gallons or less	10 gallons	5 gallons
551 - 1,000 gallons	13 gallons	7 gallons
1,001 - 2,000 gallons	26 gallons	13 gallons

Tank Tightness Testing

Tank tightness testing must be able to detect a 0.1 gallon per hour leak rate from any portion of the tank, with at least 95% probability of detection and no more than 5% probability of false alarm, taking into account the effects of thermal expansion, vapor pockets, tank deformation, and water table. The two methods that can be used to perform tank tightness are volumetric and non-volumetric testing. Volumetric testing measures product level changes over time. Non-volumetric testing can include applying vacuum and measuring the loss of vacuum over a period of time, adding a tracer to the tank and measuring the tracer gas in the surrounding soil, mass technology, and acoustic technology.

Automatic Tank Gauging

Inventory control and equipment that detects 0.2 gallon per hour leak rate from any portion of the tank are used to perform automatic tank gauging. Because of the variety and sophistication of modern electronic and mechanical tank gauging and monitoring systems, such systems should be installed and maintained in strict accordance with the instructions of the manufacturer. To ensure accuracy, the systems should be tested and calibrated at the time of installation.

Vapor Monitoring

Vapor monitoring tests the vapors within the soil of the tank excavation area. This method is used only if the soils are sufficiently porous and the stored material is sufficiently volatile to allow for a vapor level detectable by monitoring devices. Vapor monitoring is not effective in areas where there is a high or fluctuating water level, or in areas where a previous release is present. Monitoring may employ continuous electronic systems or manual procedures done periodically.

Groundwater Monitoring

Testing and monitoring groundwater can be used to determine if a UST is leaking. Groundwater monitoring wells are installed in the vicinity of the tank and are checked for the presence of product material. There are several considerations for the design of a groundwater monitoring system, including the type of material stored in the tank, groundwater level, hydraulic conductivity of the soil, and other well design requirements.

Interstitial Monitoring

In double-walled tanks, the interstitial space between the outer wall and the inner tank can be monitored through the use of a variety of either manual or electric systems designed to detect the presence of vapor, stored liquid, water, or pressure change within the interstice. Vapor and liquid monitoring system probes are installed in the interstice. In some systems, a liquid is introduced into the interstice and the level of this liquid is monitored either visually or electronically. Any change in the liquid level in the interstice indicates a leak in either the inner or the outer wall. All interstice monitoring systems, whether mechanical or electrical, require precise installation, testing, and calibration.

Line Monitoring

Monitoring can be performed with the use of automatic line detectors, line tightness testing, or any of the applicable tank release detection methods described above. Line leak detectors are available for underground pressurized lines. A leak is indicated by a restriction or shut off of flow through piping or when an alarm is triggered. Mechanical leak detectors normally utilize a pressure-sensing valve that severely reduces flow when tripped.

4.2.13.Certification

40 CFR 280.20 (e) requires that owners and operators certify that tanks have been properly installed in accordance with a code of practice developed by a nationally-recognized association or independent testing laboratory, and in accordance with the manufacture's instructions. This certification can be performed by an installer who has been certified by the tank manufacture; using an installer who is certified by the implementing agency, a professional engineer trained and experienced in tank system installation, or by the implementing agency.

RCRA HW regulations under 40 CFR 264.191 also requires installation, assessment and certification of HW tanks system and components design by an independent, qualified registered professional engineer.

4.3. CONTAINER STORAGE

Petroleum products such as lube oil are routinely stored in small containers, typically 55-gallon drums. Since 40 CFR 112 applies to oil areas with an aboveground storage capacity of over 1,320 gallons of oil (provided that no single container has a capacity of over 660 gallons), an area can require an SPCC Plan. However, a storage area with less than 1,320 gallons of oil may still want to observe SPCC practices; inclusion of such a site in the SPCC plan is at the discretion of the spill control coordinator.

Spills from 55-gallon drums are largely due to negligent handling practices such as dropping, tipping, or otherwise rupturing drums during transfer and handling. A common cause of a drum rupture is puncture during forklift operations. Another major cause of leaking drums is improper storage conditions - drums being stored outdoors where they are susceptible to weathering, corrosion, or vandalism.

Drums are routinely handled by equipment such as forklifts, warehouse tractors, cranes, and hand trucks. Within shops, drums are often stored on pallets constructed of wood or metal. Pallets generally store four drums, and pallets of drums are often stacked on top of each other. As a rule of thumb, pallets of drums should never be stacked more than three levels high. Pallets not only allow for easier handling of the drums, but also facilitate visual inspection of the drums for leaks or spills, as well as keeping drums off the ground where they could contact standing water or other liquids that could cause the drums to corrode.

Ideally, drums should be stored where they will be protected from the elements, either indoors or in a covered outdoor storage area. If drums must be stored outdoors, the storage area should be away from traffic, and the drums should be on pallets or racks to protect the drums from standing water. Additionally, drums should be stored on their sides so that water will not accumulate on top of the drum and encourage corrosion of the drum. All outdoor drum storage areas vulnerable to traffic collision damage should be moved to traffic-safe areas or should be protected with properly marked, visible crash posts, or similar barriers.

Secondary containment for container storage areas is often curbing (see Chapter 7). For uncovered outdoor drum storage areas that are curbed, drainage control becomes a significant issue; if no means of drainage control is provided, drums may end up rusting in accumulated precipitation. To correct such a case, a roof could be built over the storage area, accumulated precipitation could be pumped out as necessary using a vacuum or defueling truck, or a drain pipe could be installed that will lead to a treatment unit such as an oil/water separator. Figure 4-19 shows a typical drum storage area.

With container storage areas, a major SPCC concern is good housekeeping practices. The storage area should be clean and orderly to reduce safety hazards and accidental releases. Good housekeeping practices also allow the detection of leaks and spills from drums. The container storage area should have adequate aisle space to permit unobstructed movement of personnel and material handling equipment such as fork-lifts. These aisles should be kept clear, and drums and other containers should be kept from protruding into the aisle space. As a rule of thumb, main aisles that are used for entry and exit should be at least 8-feet wide, while all other aisles should be at least 4 feet wide.

NFPA 30 apply to storage of flammable and combustible liquids in containers and portable tanks with capacities of less than 60 gallons. The code applies to the design, construction, and operation of storage cabinets, inside liquid storage areas, hazardous material storage lockers, and other areas used for incidental flammable and combustible liquid storage. NFPA 30 should be referred to for general storage requirements. Leakage control and spill containment systems are required to prevent flow into adjoining areas, property, or critical natural resources. For lockers, the containment system should have the capacity to contain 10% of the total volume of liquid stored or the volume of the largest container, whichever is greater.

Polychlorinated Biphenyls (PCBs) stored for disposal must have secondary containment (40 CFR 761.42). Containment structures must comply with standards for capacity, structural strength, material compatibility, impermeability, and integrity to prevent contained HS from escaping confinement. Small sumps (3 to 4 gallons) or drip pans, can also be placed around a fill port to collect spills from disconnected transfer lines. Adequate drainage systems must also be provided in these areas to prevent contaminated run-off from discharging into navigable waters.

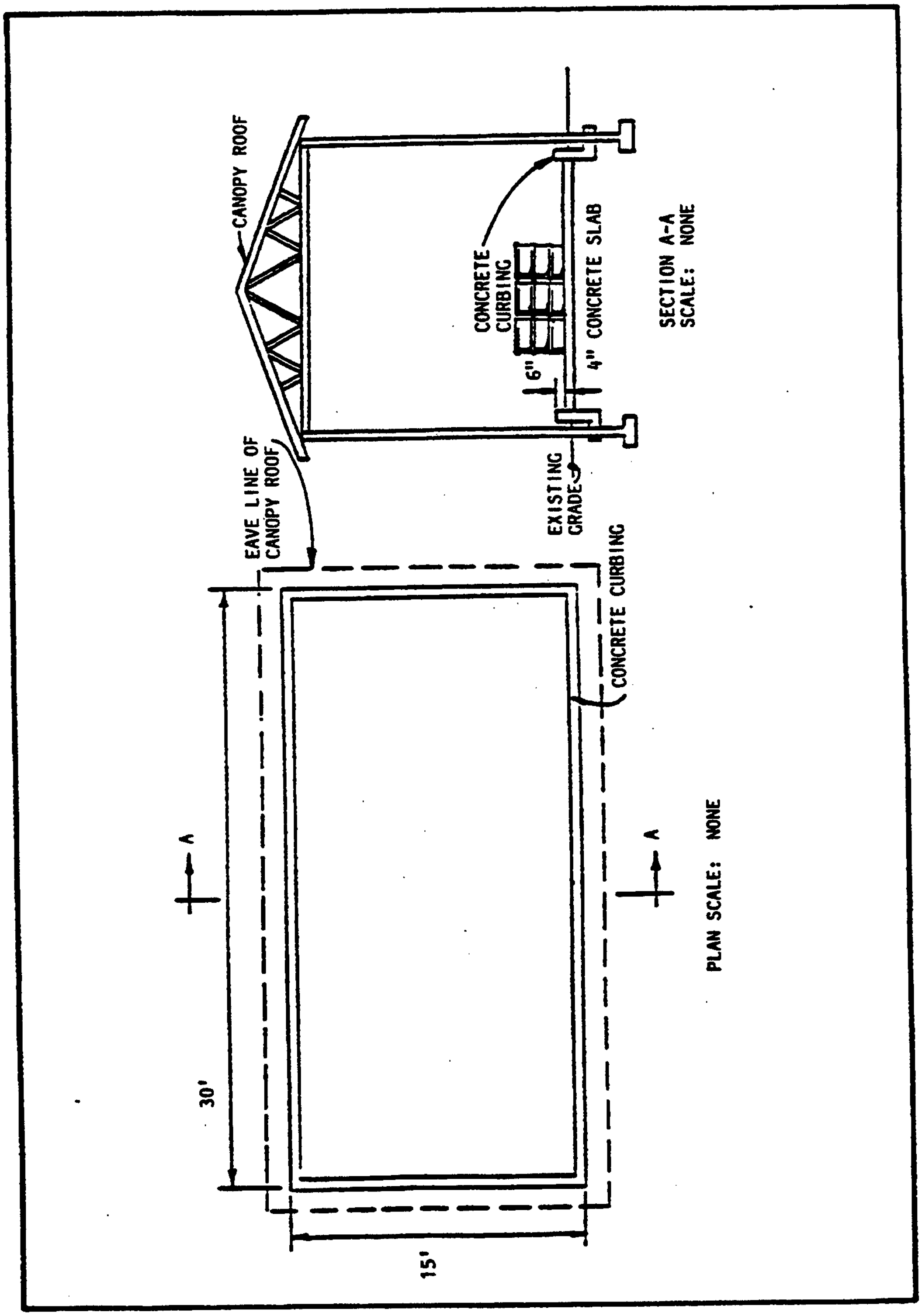


Figure 4-19
Typical Drum Storage Area

4.4. IDENTIFICATION AND LABELING.

Tanks and other types of containers should be properly marked and labeled to identify their content. Operator errors such as opening the wrong valve or loading the wrong tank or container can be prevented if equipment is properly identified. DOT and NFPA labels, color-coding and MIL specs labels are methods widely used in the Navy. Hatching couplings and color-coding of transfer lines are very effective means to prevent incompatible mixing and product contamination.

Tanks are commonly placarded and labeled using the DOT and NFPA systems. These systems are described in detail in Section 5. DM-5.13 requires aboveground pipes 3/4" outside diameter (0.D.) or larger to bear legends identifying their contents and arrows showing direction of flow. Labels must have color-coded backgrounds signifying the level of hazard they present. For legends, the type and size of characters must comply with MIL-STD-161E.

CHAPTER 5

TRANSFER AREAS

5.1. INTRODUCTION

Transfer areas apply to oil and hazardous substance (HS) bulk plant loading and unloading areas, in-plant closed transfer process and piping systems, dispensing stations, and non-bulk loading and unloading areas. Bulk oil and HS product and waste transfer operations routinely take place in the vicinity of the storage tank and at remote tanker loading and unloading areas. Non-bulk transfers take place at HS storage areas, hazardous waste (HW) accumulation storage points, and other container storage sites. Oil transfer areas are subject to specific spill prevention, control and countermeasure (SPCC) requirements. Area related guidance is a general SPCC guidance which addresses multiple regulations, not just 40 CFR 112. HS transfer areas are included based on best engineering practices.

Bulk oil is usually delivered to a naval area by marine craft, tank truck, railroad tank car, or pipeline. Bulk HS is delivered by a tank truck or delivered in 55-gallon drums by a truck. Oil is normally stored for transfer to aircraft, automobiles, military vehicles, construction equipment, ships, and portable storage units. HS is stored for transfer to the end user, or a processing plant.

Transfer operations may be performed by gravity or with the use of pumping systems, or a combination of both. Transfer equipment can be sophisticated, such as a multi-valved, manifolded loading/unloading rack servicing several tanks, or simple, such as a top port and bottom dispensing valve on a small aboveground storage tank. Equipment common to most transfer areas includes pumps, strainers, gauges, valves, filtration equipment, meters, loading/unloading arms or hoses, controls (pump start and stop switch,), and associated piping and instrumentation (tank-level indicators/alarms). Pumping systems are typical of bulk oil and HS storage tanks, industrial waste treatment plants and shop processes, where transfer operations are conducted under monitored conditions.

Some areas use the same equipment, such as loading/unloading racks, to receive and dispense the oil and HS. Other areas receive the oil and HS at one point and dispense it from another. One example is a gas station that receives oil at a ground level fill port and dispenses it through gasoline pumps. Another example is a small aboveground horizontal tank which is simply loaded through a top port and dispensed through a bottom valve.

Oil and HS spills at transfer areas most commonly occur when transfer hoses are disconnected, tanks overflow during filling operations, pumps break or leak, and transfer lines or hoses leak or rupture while in use. This chapter presents the criteria to evaluate the adequacy of oil and HS transfer areas and suggests possible corrective actions. In the evaluation of an area's transfer system, the following SPCC criteria elements should be considered: pipeline structural stability, corrosion protection, pipeline testing, pipeline identification, out of service pipelines, couplings, transfer pump operation, overfill protection, traffic collision protection, vehicle positioning and early departure prevention, marine receiving areas, and tank car and tank truck loading/unloading rack requirements.

5.2. PIPELINE STRUCTURAL STABILITY 112.7(e)(3)(iii)

Oil and HS transfer pipelines can be aboveground, underground, or both. Typically, underground pipe networks service underground tank installations, while aboveground storage tanks will have either aboveground or underground piping. Pipelines are constructed of carbon steel, stainless steel, fiberglass reinforced plastic (FRP), or polyvinyl chloride (PVC). Flexible piping is also used where applicable. For example, fuel hoses are made of flexible piping used to make connection between the steel piping and the tank cars, trucks, and vessels.

Pipelines must be properly designed and supported to prevent stress failure. Support integrity, support spacing, and pipeline expansion and contraction caused by thermal reaction of contained substance are the most important areas of concern in preventing spills due to pipeline failure. To meet the requirements of 40 CFR 112, the pipe supports should be evaluated for axial movement, loading, abrasion, and corrosion.

5.2.1. Support Integrity

Aboveground piping is preferred where it is not aesthetically objectionable or when it may be subject to physical damage, either accidental or deliberate. Pipe supports carry the structural load of the aboveground pipeline and protect aboveground pipes from corrosion through soil contact. Pipe supports may consist of concrete piers, hangers, metal supports, straps, rollers, cradles, or a combination of these. Figure 5-1 shows a typical pipe support.

Aboveground piping supports the bottom of the pipe to ensure piping is approximately 18 inches above the ground. In areas subject to flooding, greater clearance may be desirable. Piping on supports, both insulated and non-insulated, should rest on a steel shoe welded to the bottom of the pipe. The shoe should be left free to move on the support. Anchors and guides may also be required to control movement in long runs of straight pipeline, or near a connection to fixed equipment such as a pump or filter. Piping on piers shall be run above the pier deck whenever possible.

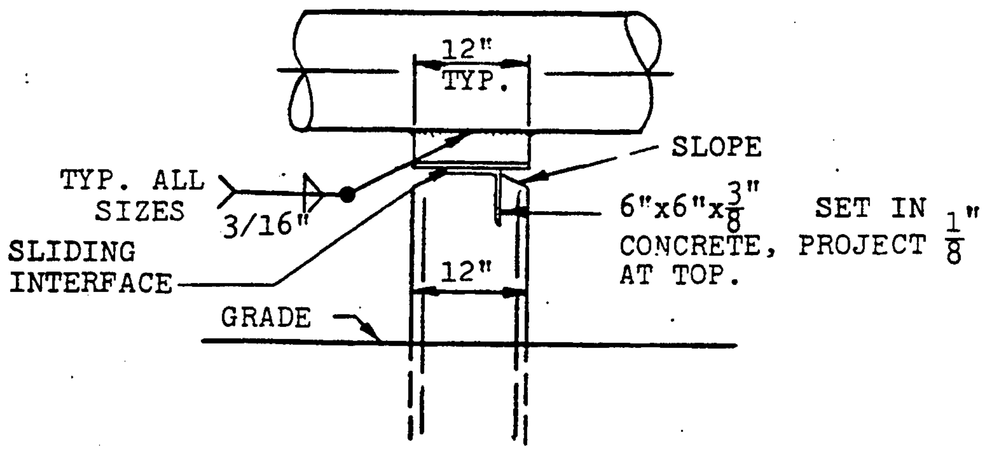


Figure 5-1
Typical Pipe Support

Aboveground pipe supports should be designed in accordance with DM-22 and constructed with good structural practice. If not designed and maintained properly, pipe supports can damage or stress a pipeline by severely restricting the natural movement of the pipeline and can damage the pipeline when it does move, or by serving as a place for water to collect and cause corrosion. 40 CFR 112(e)(3)(iii) requires that pipe supports should minimize abrasion, corrosion, and allow for expansion and contraction.

Paint or debris can lock the pipeline to the support. Signs of abrasion such as scarring, scratches, or exposed pipe metal can also indicate lack of free axial pipeline movement or overloading. Felt pads are often used between steel pipes and concrete supports; the condition of these pads should be checked regularly.

If a pipeline carries a different substance other than that for which it was designed and the new substance is heavier than the original, then the pipe supports may be loaded beyond their capacity. Pipeline supports are designed to support the load of the substance and the pipeline.

When a support fails, the loading on the other supports increases, and a section of pipeline is under excessive stress due to the lack of support. Pipe supports should be inspected regularly and repaired when broken. Unsupported pipeline sections should be examined closely to observe any excessive movement and excessive wear at pipe support interfaces and for leaks at pipe joints.

5.2.2. Support Spacing

The type and spacing of pipe supports depends upon the pipe size and the applied static and dynamic loads. Static loads include the weight of the pipe and the product it carries. Dynamic loads include vibration, collision, hydraulic surges, and thermal expansion and contraction. Improperly spaced, constructed, or maintained pipe supports can lead to pipe failure and a spill. If pipe supports are not adequately

spaced, intermediate supports can provide the proper spacing. Table 5-1 lists suggested pipe support spacing as a function of pipe size, pipe type, and support conditions. The recommended pipe support spacing presented in this table should not be considered as absolute. Minor variations can be tolerated without jeopardizing the integrity of a piping system.

5.2.3. Pipeline Expansion and Contraction

Both the pipeline and the material transported may expand and contract due to changes in process or ambient (air or ground) temperature. Piping systems must allow for thermal expansion and contraction to avoid harmful stresses. Roller or hanging pipe supports provide free axial pipeline movement and are preferred over other types of pipe supports. Another acceptable arrangement is a small skid welded to the bottom of the pipeline which slides in a grove on the pipe support. Improvised pipe supports, such as resting pipes on railroad ties or tires, are unacceptable. As pipeline diameter decreases, movement becomes less of a concern because smaller pipelines generally have shorter pipeline lengths, lower flow rates, and smaller product temperature ranges.

Evidence of broken welds, scrapes, and visible bows in pipeline sections may indicate a support is not properly designed for expansion and contraction forces. If adequate provisions for pipeline expansion and contraction over a pipe support do not exist, it may have to be modified or replaced. A slip plane underneath fixed supports to allow for the free movement of a pipeline can be a simple and effective solution.

Substance expansion can also lead to excessive in-line pressures such as kinks in straight pipeline segments. Pressure relief valves or surge suppressers can be used to control stresses caused by substance expansion. Pressure relief valves should not be allowed to discharge to the atmosphere, storm drains, or sanitary sewers. Downstream piping leading to an atmospheric pressure tank, or drain lines leading to a surge tank are common ways to circumvent this problem. Pressure relief valves should not be used unless a pipeline segment can be isolated by valves and/or operating conditions require such valves (i.e. high expansion substance, high system pressure). Reducing system pressure or using reflective paints to reduce heat may be alternatives to pressure relief valves.

Reducing the length of straight pipeline segments by changing piping direction, offsets, loops, bends, and expansion joints can also be used to accommodate thermal expansion and contraction in pipelines. Loops and bends are more practical if space is available, and the segment is accessible. Installation of new pipeline segments or expansion joints should require no more than one day to complete following purging of the line.

The above guidelines are only intended to help identify potential structural instability problems. Corrective actions such as replacing or modifying a support, adding loops, bends, relief valves, or expansion joints to a pipeline should be evaluated and approved by design experts (chemical, mechanical, or structural engineers).

Table 5-1
Pipe Support Spacing

Pipe Size*	Schedule or Weight	Support Spacing (Feet) Continuous Spans	End Spans
1/2"	80 (xs)	8	5
3/4"	80 (xs)	10	7
1"	80 (xs)	13	9
1-1/2"	80 (xs)	18	12
2"	80 (xs)	21	14
2-1/2"	40 (STD)	21	14
	80 (xs)	25	17
3"	40 (STD)	23	17
4"	40 (STD)	27	20
6"	40 (STD)	32	26
8"	30	37	30
	40 (STD)	40	32
10"	30	40	33
	40 (STD)	43	35
12"	30	43	35
	(STD)	46	38
14"	20	43	35
	30 (STD)	48	39
16"	20	43	37
	30 (STD)	48	39
18"	20	35	37
	(STD)	51	41
20"	20 (STD)	49	41

* Welded Steel Pipe ASTM A53, Grade B; maximum temperature 150 °F; no

Source: DM-22 (Petroleum Fuel Areas).

5.3. PIPELINE CORROSION PROTECTION

40 CFR 112.7(e)(3)(i), 40 CFR 264.192(f), 40 CFR 280.20 (5)(b), 49 CFR 192(Subpart I), 195(Subpart D)

Pipelines, like tanks, are subject to corrosion, which can cause the system to deteriorate and result in a spill. Aboveground piping can be readily inspected and maintained. A common cause of corrosion on aboveground piping is the accumulation of drips of liquid (from rain or condensation) on the bottom surface of the pipe. When examining the pipeline's supports, check the pipeline for corrosion on its bottom surface.

40 CFR 112.7(e)(3)(i) states that new buried metallic piping should be protected from corrosion. Corrosion protection may consist of coatings, wrapping, painting, cathodic protection, or other effective methods. Buried pipeline that is exposed for repairs or improvements should be examined for evidence of corrosion. If corrosion damage is found, additional examination and corrective action should be taken. All underground or underwater pipelines or tanks should be painted, coated, or wrapped, and should also have cathodic protection.

One method of avoiding corrosion is to install FRP or PVC piping. If this is not feasible, there are two methods of pipeline corrosion protection: protective coating systems and cathodic protection. In the protective coating systems method, the coating acts as a buffer because the metal piping is no longer in direct contact with the corrosive environment. In the cathodic protection method, the metal pipe surface acts as the cathode, and a metal anode that is more negative is applied. The anode corrodes while the metal pipe cathode is protected.

5.3.1. Protective Coating Systems

Protective coatings work by creating a barrier to moisture, oxygen, and electrical current, thus, sealing the metal pipeline from the corrosive environment. Protective coatings are applied to protect both exterior and interior surfaces.

According to DM-22 and good engineering practice, the exterior surfaces of all underground steel piping systems should be protected by either an extruded polyethylene coating system or a coal tar double-wrapped felt system. Field joints and irregular shaped fittings can be protected with pressure-sensitive organic plastic tape. All exterior surfaces of aboveground steel piping systems should be protected by a coating of a zinc-rich primer, one bond or tie coat, followed by two or more coats of vinyl paint. For recoating of existing piping under a pier, greased absorbed wrapping tape with 50 percent overlapping should be used.

A common location of pipeline corrosion is the point where aboveground piping enters the ground. In this situation, the pipeline should be wrapped several inches above and below the air-soil interface, as shown in Figure 5-2.

Most regulatory agencies require protective coating systems in conjunction with other forms of corrosion protection, such as cathodic protection. It should be noted that a good coating system will decrease the size and cost of the cathodic protection system that is needed and increase the life of the protection system.

5.3.2. Cathodic Protection

Buried piping can easily corrode if it is not properly protected. Cathodic protection prevents corrosion by making the entire surface of the metal pipe act as the cathode of an electrochemical cell. There are two methods of applying cathodic protection to underground metal pipelines: sacrificial or galvanic anodes, and impressed current. Figure 5-3 illustrates the localized corrosion of buried piping, while Figure 5-4 shows a common way to protect underground piping cathodically using sacrificial anodes.

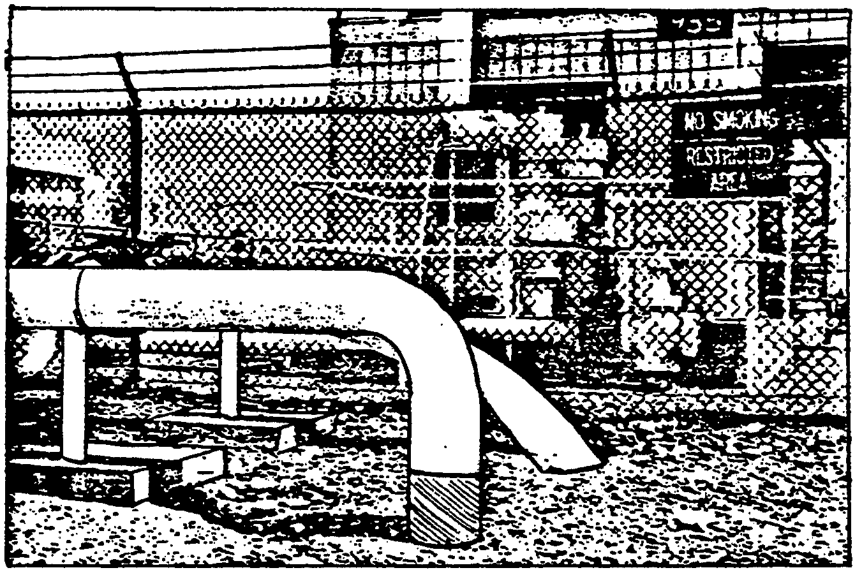


Figure 5-2
Piping Wrapped at the Air-Soil Interface

Another cause of buried pipeline corrosion is a long-range corrosion cell that is created due to a difference in terrain, as shown in Figure 5-5. In this situation, an impressed current system, illustrated in Figure 5-6, will protect the pipeline against corrosion.

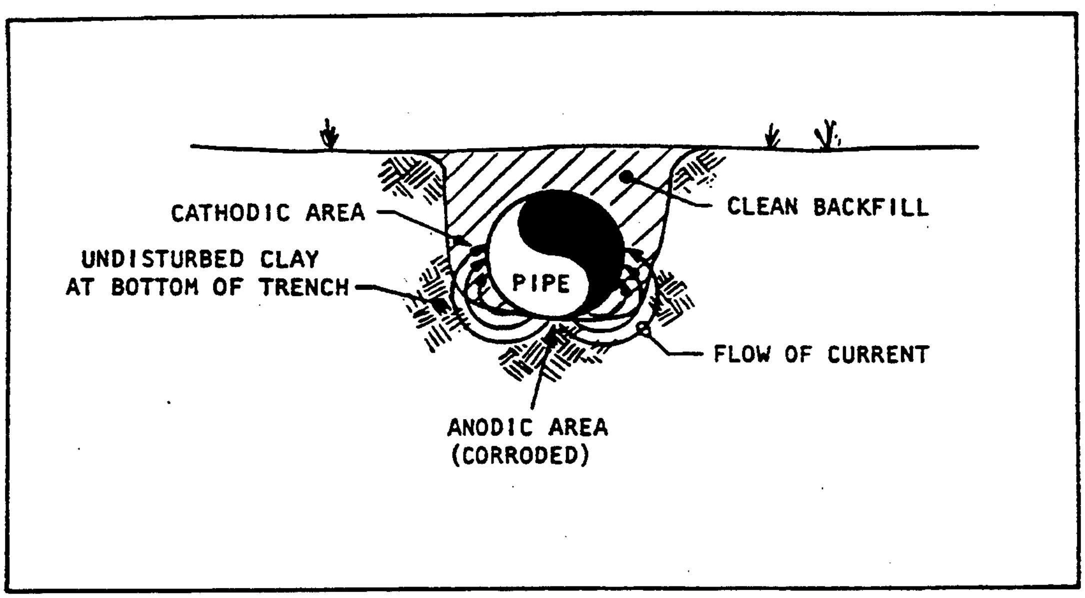


Figure 53
Localized Corrosion Caused by Soil Differential

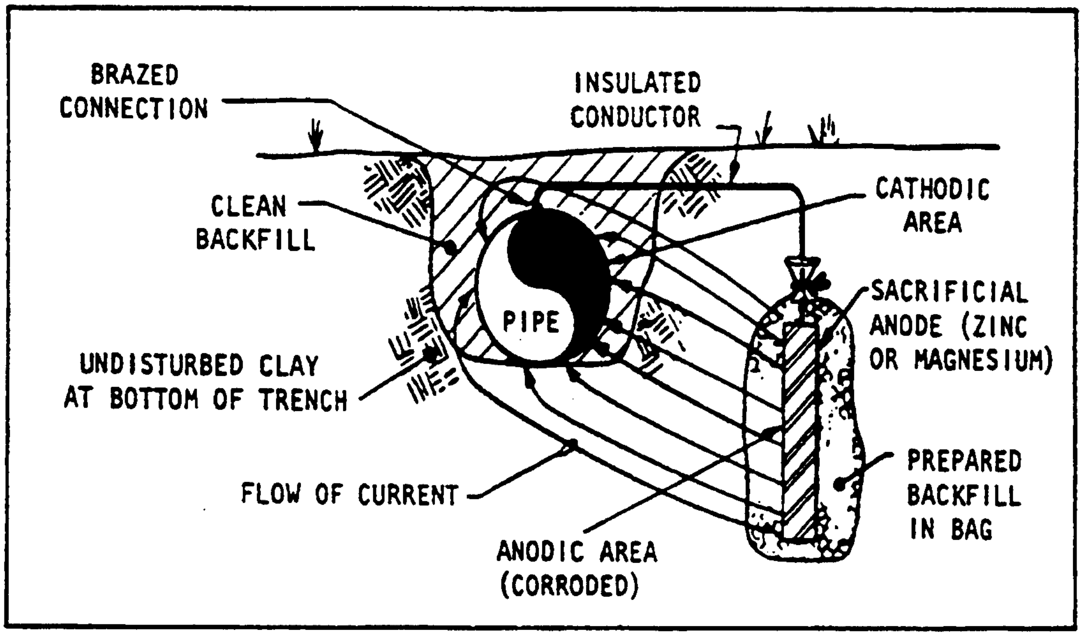


Figure 5-4
Cathodic Protection of Pipeline Using Sacrificial Anodes

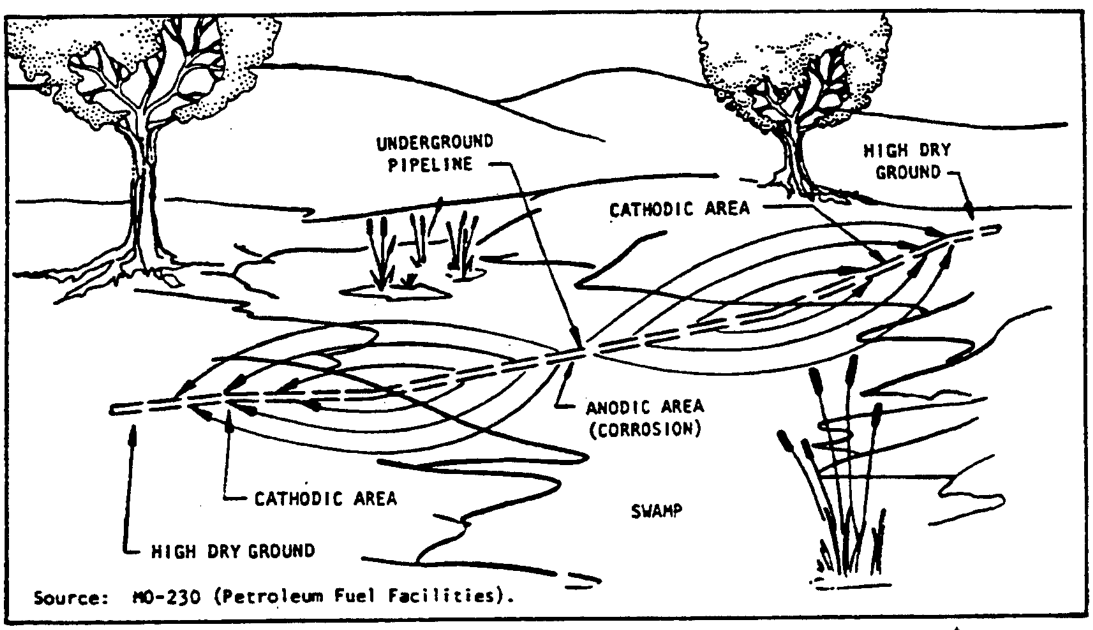
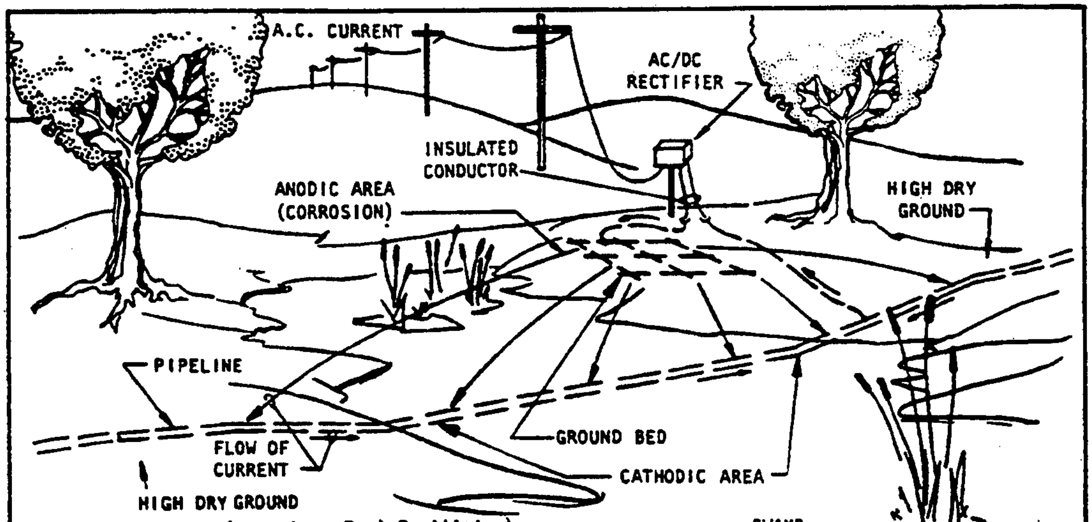


Figure 5-5
Long-Range Corrosion Cell Due to Difference in Terrain



Source: MO-230 (Petroleum Fuel Facilities).

Figure 5-6
Cathodic Protection of Pipeline Using Impressed Current System

Sacrificial or galvanic anode systems use a metal anode more negative in the galvanic series than the metal to be protected. The active metal anode corrodes (is sacrificed) while the metal pipe cathode is protected. This method protects localized "hot spots" in a pipeline, well-coated pipelines, and locations where the impressed current method poses a hazard.

The second method uses impressed current from an external source to reverse the flow of electrons and prevent corrosion. Impressed current anodes are made of relatively inert materials, such as carbon or graphite, and have a very low rate of corrosion. This method is used for large, bare, or poorly coated surfaces.

As a retrofit method, cathodic protection is particularly effective for underground applications where it is impractical to excavate and coat buried pipes. Cathodic protection is more effective and less expensive on coated structures, since the amount of protective current required is proportional to the amount of bare metal exposed to the corrosive media. Therefore, impressed current systems are usually the best retrofit for buried systems.

5.3.3. Corrosion Protection Testing and Inspection

As discussed in Chapter 4, all UST cathodic protection systems, including those installed in piping systems, must be inspected for proper operation and tested within 6 months of installation and at least every 3 years as required under 40 CFR 280.31.

5.4. PIPING SYSTEM TESTING 112.7(e)(3)(iv)

All aboveground pipelines and valves should be examined regularly by operating personnel. The general condition of flange joints, expansion joints, pipeline supports,

valve glands and bodies, locking of valves, and metal surfaces should be assessed. In many cases, pipeline leaks go undetected, particularly when pipelines are buried or otherwise inaccessible. In such cases, a pressure test may be the only method for identifying a leak. 40 CFR 112(e)(3)(iv) recommends periodic pipeline pressure testing if a rupture of the pipeline could cause a spill event.

SPCC pipeline testing requirement is much less stringent than that required by DM-22, NFGS-15195, 49 CFR 192 (Subpart J), and 49 CFR 195 (Subpart E), and may already be met by activities performing pipeline tests as required. These regulations and specification methods meet or exceed SPCC requirements and provide direction for pressure testing. These guidelines also prescribe that safety relief devices used on liquid pipelines be pressure tested annually.

Corrosion, abrasion, and other forms of wear reduce the thickness of pipeline walls, which leads to pipeline failure. Consequently, conducting thickness tests can be a alternative method for determining pipeline integrity. Pipeline segments should be replaced when the pipeline wall thickness is below the retirement thickness.

For underground piping, however, testing the wall thickness is in most cases, impractical. If the soil conditions indicate a corrosive environment, periodic spot-checks of underground piping systems may be advisable. This requires uncovering the pipeline in selected locations and inspecting the condition of the exposed sections with visual examinations and thickness tests.

In recent years, a wide range of pipeline testing technologies has been developed. A summary of these technologies as well as older more established technologies is presented as follows:

Helium testing is used by injecting helium into a pipeline and using a hand held thermal conductivity sensor to sample for helium leaks along the pipeline. Since the sensor can only detect about 100 ppm and approximately 5 ppm of helium exists in the background, the pipeline must contain a very high concentration of helium and the samples must be taken near the pipe for this test to be reliable. Samples taken on a windy day are suspect. This test must be accomplished on completely empty pipelines since any liquids in the line could trap the helium from exiting the pipe. Several suppliers can provide this technology. The test is highly subject to human error and method of sample collection.

When conducting hydro testing, segments of the pipeline are blinded and tested with product or water at 1.5 times the normal pressure. Hydro testing has no leak location capability. The pipe system must be taken out of service for extended lengths of time. This can be an accurate test for piping as long as the test is conducted to eliminate air pockets, valve leaks and thermal effects. In many cases, hydro tests are not conducted properly or for an adequate length of time to allow for thermal equilibrium.

Hydrocarbon vapor monitoring employs a horizontal tube, buried with the pipeline, to collect vapor from the surrounding soil. This air or soil gas is sent to a metal oxide or infrared detector. This monitoring method can be effective with lighter products such as

gasoline. Location is determined by timing the evacuation of the sample. Sensors will most likely not be able to distinguish current leakage from background contamination. Hydrocarbon vapors do not adequately transport through soil because they biodegrade within just a few feet of the leak source. Geology and the water table affect this method if it is relatively shallow in relation to the pipeline.

There are two types of liquid sensing cables that have been in use primarily for double-wall pipe interstitial monitoring. One technique is comprised of a pair of wires wrapped in a conductive polymer sheathing, which when in contact with hydrocarbons it expands to shunt the wires or close the circuit at that point. The location is accurately indicated to within one foot based on Ohms Law and the known resistance per foot of the wires. The cable can be pulled through a conduit along a pipe so that it can be removed for inspection and replacement. Water and hydrocarbons are detected with two different cable types.

The second method employs a coaxial cable which when immersed in liquids changes impedance and acts as an indication of leakage. Its sensitivity will vary with the length of cable installed and it must be buried directly along the pipeline. Therefore, it cannot be removed without excavation. Water and fuel may be detected with the same cable making it difficult to distinguish between the two at times. Connections are problematic and may cause false alarms. Since the detection of the leak is dependent on a direct contact with the liquid, placement of the cable is very important with regard to water table and geology.

Mass balance technology employs meters at each end of the pipeline to measure and compare throughput. The sensitivity of this approach depends on the accuracy of the meters, length of the pipeline, and temperature changes in the product. Leak sensitivity is usually stated in the range of 0.1 to 1 % of the flow rate. Monitoring pressure and temperature can enhance this method. It will also, when coupled with a computer, allow for rapid response for closing valves or turning off pumps. The one drawback to this technology is that there is no leak location capability.

Pressure sensors located along the pipeline are used to model pipeline changes. The sensitivity is a function of pipeline length, temperature, and product. Using standard physical laws, temperature corrected pressure is translated into pipeline leak status in the range of 10 to 50 gallons per day. Leaks cannot be accurately located with pressure monitoring. Monitoring flow and temperature can enhance this method. Pressure sensors provide rapid response for shutting motorized valves or turning off pumps.

Rarefactive Wave is a "sonar" type system that uses dynamic pressure sensors similar to microphones to detect the wave front of a negative pressure wave traveling down the pipeline from the point where a leak or pipe breach occurs. This is a real time measurement of the time the wave front reaches each pressure sensor so that location can be accurately reported. The sensitivity of this test is 24 gallons per day. Sophisticated software will nullify extemporaneous noise from pumps or valves. This

method will provide rapid response for system shut down and will locate the leak to within a few feet of actual location.

Tracer technologies employ a volatile chemical marker that is added to the product. Air is sampled along the pipeline through hollow probes for the presence of the marker. This method is similar to hydrocarbon monitoring only in the way the samples are collected. The tracers, unlike hydrocarbons, are less prone to bio-degradation. They can, therefore, be seen at much greater distances from the leak source. This fact, along with the high sensitivity of the detector, allows for the detection of very small leak rates. This can be applied as a one-time test or for continuous monitoring. The sensitivity is 1 gallon per day and leaks can be located to within a few feet before excavation. The pipeline system remains in service during the test. Background contamination does not interfere with this technology.

Volumetric methods of leak detection will measure liquid lost under pressure to determine leakage. Making measurements at two different pressures to reduce the thermal error enhances the accuracy. The pipeline system must be taken out of service during the test. All air pockets must be eliminated and the system must be flanged to eliminate valve leakage. Leaks cannot be located using this method.

5.5. PIPELINE IDENTIFICATION

Proper identification of pipelines, transfer hoses, and the type of substance they store is not required in 40 CFR 112; however, the improper loading and transferring of a substance due to unlabelled valves, controls, and portholes has resulted in spills. Fuel has accidentally been loaded into a storm drain when an untrained operator mistook it for the fill port for an underground storage tank. Oil has been discharged from a tank vent because the operator could not identify the proper control valve after the overfill alarm sounded. Operator errors such as these can be prevented if pipelines and equipment are properly identified. DOT and NFPA labels, color coding, and MIL specification labels are methods widely used in the Navy. Matching couplings and color coding of transfer lines are very effective means of preventing incompatible mixing and product contamination.

Pipelines should be clearly marked to identify the specific product. Pipeline identification can include color-coding, banding, or labeling. MIL-STD-101B is the standard for color coding pipelines, and MIL-STD-161F is the standard for new pipeline labeling. These standards should be followed for all piping, including new and existing pipelines. In addition to pipelines, all valves, pumps, meters, and other items of equipment shall have easily discernible painted numbers, numbered corrosion-resistant metal, or plastic tags attached with a suitable fastener. Numbers shall correspond to those on the schematic flow diagrams and other drawings for the installation.

MIL-STD-101B establishes, defines, and assigns a color for recognition to each of six classes of materials. Five of the classes represent universally recognized hazards involved in the handling of dangerous gases and liquids. The sixth class is for the exclusive use of fire protection materials and equipment. This basic color code requires

application of color warnings in a distinctive manner as a visual aid and supplements the identification markings on compressed gas cylinders and piping systems.

A primary color identifies the safety hazard. These colors appear as a circular band on piping systems and as main body, top, or band colors on compressed gas cylinders. Secondary colors appear as arrows (or triangles) on piping systems and as main body, top, or band colors on compressed gas cylinders and identify other hazards. The identifying color is for identification purposes only and not as a substitute for protective coatings. Table 5-2 presents the colors used as both primary and secondary warnings.

Table 5-2
Pipeline Warning Colors

Color	Material	Warning
Yellow, No 13655	flammable materials	all materials known ordinarily as flammables or combustibles
Brown, No 10080	toxic and poisonous materials	all materials extremely hazardous to life or health under normal conditions as toxics or poisons
Blue, No 15102	anesthetics and harmful materials	all materials productive of anesthetic vapors and all liquid chemicals and compounds hazardous to life and property but not normally productive of dangerous quantities of fumes or vapors
Green, No 14187	oxidizing materials:	all materials which readily furnish oxygen for combustion and fire producers which react explosively with the evolution of heat when in contact with many other materials
Gray, No 16187	physically dangerous materials	all materials, not dangerous in themselves, which are asphyxiating in confined areas or which are generally handled in a dangerous physical state of pressure or temperature
Red, No 1110	fire protection materials	all materials provided in piping systems or in compressed gas cylinders exclusively for use in fire protection

Pipeline, equipment markings, and labels should be clear, legible, and in conformance with MIL-STD-161F. MIL-STD-161F specifies that petroleum products, piping, equipment, and hydrocarbon missile fuels fall within the yellow color code classification of materials. Lettering should be white gloss letters on a black background. Criteria for proper markings and labels, as well as examples of typical pipeline identification for fuel and petroleum products are shown in Figure 5-7.

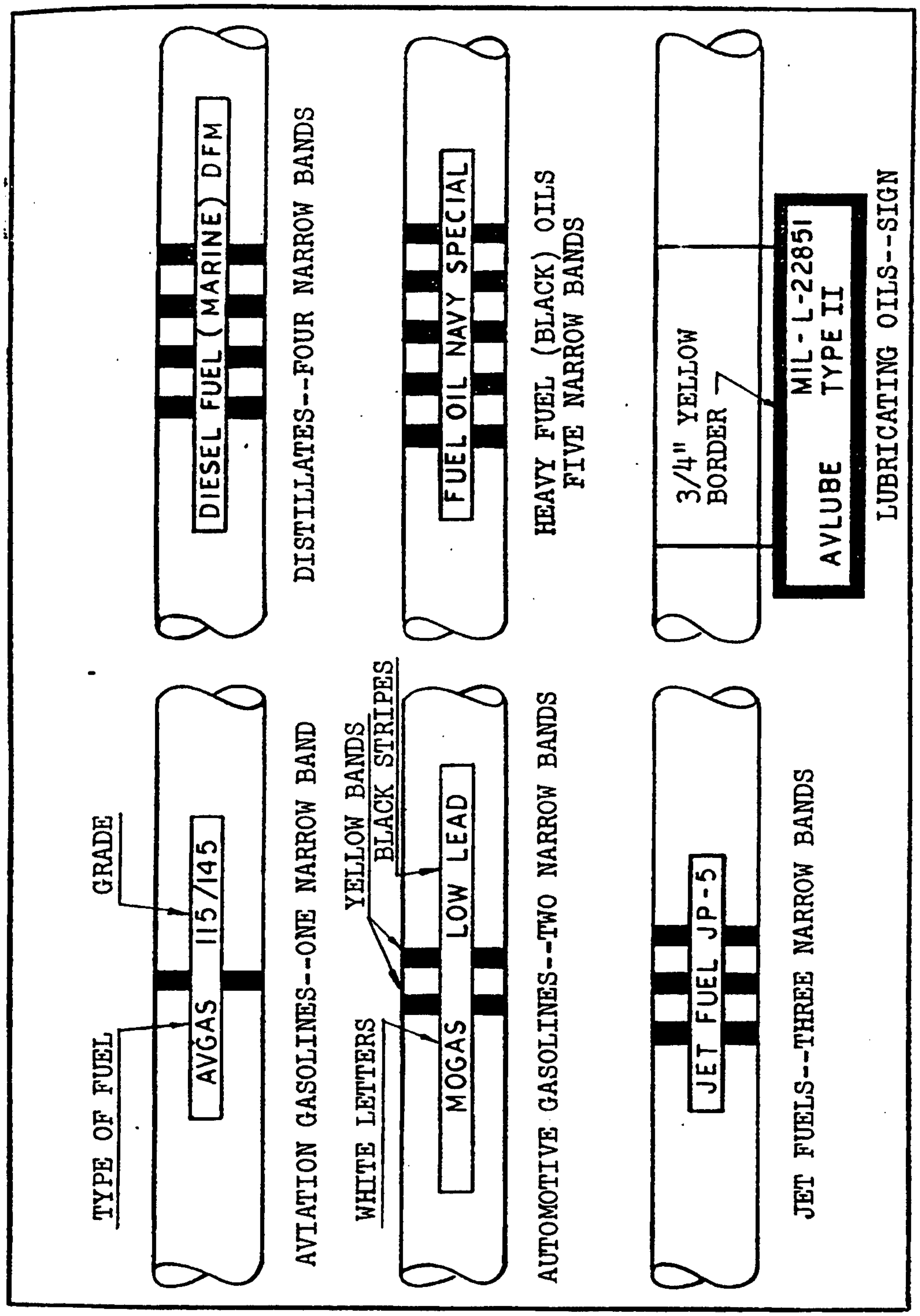


Figure 5-7
Pipeline Identification

If an area pipeline lacks proper marking and labeling, determine if the pipe network can be clearly understood upon visual inspection. Consider the number of different types of oil and HS pipelines at the area. Pipeline marking becomes more critical as the complexity of the pipe network increases.

5.6. OUT OF SERVICE PIPELINES 112.7(e)(3)(ii)

SPCC regulations require pipelines that are out of service, or in standby service for an extended period of time, to be capped or blank-flanged at the terminal connection. This prevents any release, either due to operator error or vandalism. In addition to being capped or flanged, the pipeline should be marked as to it's origin.

5.7. COUPLINGS

Using couplings equipped with valves, to block the flow when a hose is disconnected can prevent oil and HS transfer spills. The types of couplings normally used for loading and unloading operations include:

- Ordinary quick-disconnect couplings. These couplings are commonly used because they are light and easy to handle. However, they do not provide for spill control, and precautions (i.e. drip pans) must be taken to prevent spill of material remaining in the transfer line.
- Quick-disconnect couplings equipped with shutoff valves. These couplings reduce the volume discharged when hoses are disconnected but do not eliminate it.
- Dry-disconnect couplings. These couplings are equipped with a spring-loaded valve to blocks the flow when the transfer line is disconnected. Dry-disconnects are preferred since they reduce the volume of product spilled.

These types of couplings and their applications are summarized in Table 5-3. Figure 5-8 illustrates various types of couplings and material losses that can be expected for each type.

If a transfer operation does not use couplings with spill control valves, the operation must be reviewed to determine the potential impacts of not having them. Low-pressure flow rates may be controlled with drip pans, but this is not a recommended practice as it increases the spill potential. Drip pans should be used only as a temporary solution to dripping valves. If excess product after disconnection is greater than 1 gallon at each end, couplings with spill control valves should be installed. Dry-disconnect couplings are generally more cost-effective than ball valves, but operational and compatibility problems (e.g., operating pressures) may prevent their use. The quick- and dry-disconnect valves must be compatible with the oil or HS transferred. Matching couplings or hose identification should be used where incompatible HS could be mixed during transfer.

Table 5-3
Types of Couplings And Their Applications

System	Function	Spill Control	Applications
Ordinary Quick-Disconnect Coupling	Product transfer	None	Tank vehicles and storage tanks
Quick-Disconnect Coupling	Product Transfer	Built-in valve reduces spills from disconnect hoses	Tank vehicles and tanks
Dry-Disconnect Coupling	Product transfer	No spills from disconnected hoses	Tank vehicles and storage tanks
Emergency Shutoff Valves	Flow control	A fusible metal link melts and closes the valve in case of fire or impact	For use in any place where it is important to stop flow

Source: Technology for the Storage of Hazardous Liquids: A State-of-the-Art Review. New York State Department of Environmental Conservatism, 1983. Used by permission.

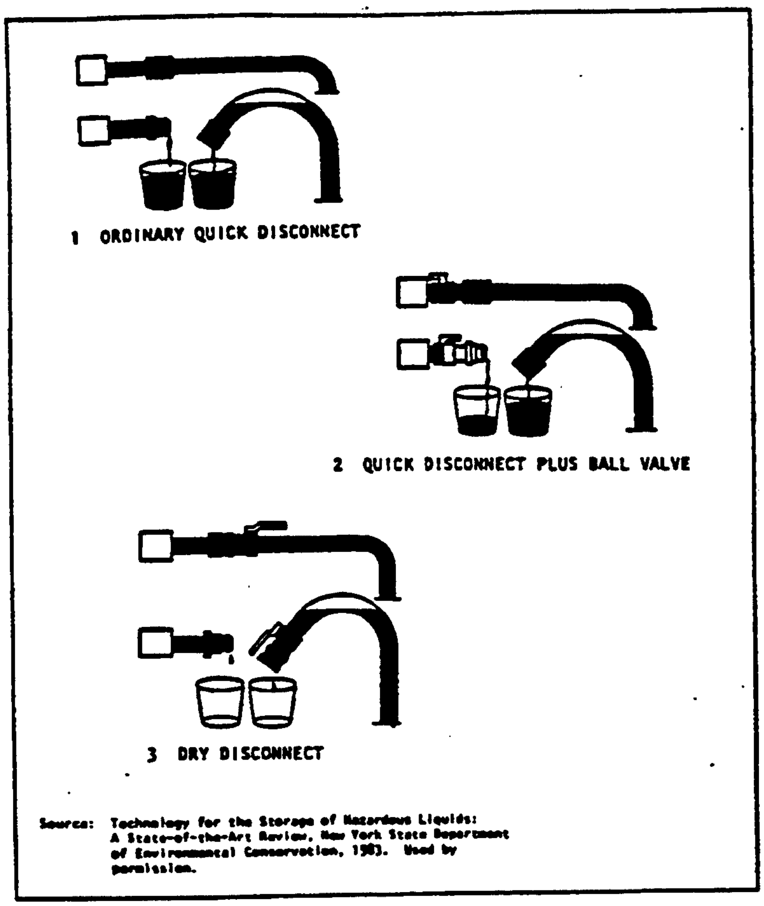


Figure 5-8
Types Of Couplings And Associated Material Loses

Factors to consider when evaluating or selecting couplings for a particular application include temperature, pressure, and material transfer properties. The higher the temperature or pressure, the more securely attached the couplings should be. Hose-coupling connections are the weakest link during transfer operations. As a rule of thumb, bolt clamp connections perform well with low pressures, band connections with low to medium pressure, and interlocking clamps with high pressures.

5.8. TRANSFER PUMP OPERATION 112.7(e)(9)(iii)

Transfer pumps vary depending upon the type of service or particular application. Pump seals and materials of construction must be designed for and compatible with the substance handled. DM-22 provides design requirements for fuel transfer pumps. Use of automatically controlled pumps are recommended to shut down pump operations to avoid overfill and spills. As discussed in Chapter 4, pump cutoff devices are connected to the storage tank high-level alarms and inlet control valves.

Installation, operation and maintenance of transfer pumps should follow the design and the manufacturer's instructions. Proper maintenance procedures will prevent operational pump leaks. An additional SPCC pump operational requirement [40 CFR 112.7(e)(9)(iii)] states that oil pump starter controls should be locked in the "off" position or be placed in a location only accessible to authorized personnel when in non-operating or standby status.

5.9. OVERFILL PROTECTION

Overfill prevention systems prevent accidental tank overflow during filling operations, control spills during pipe disconnection, and prevent overflow from surface impoundment. Overfill protection equipment is installed in storage tanks to shut off product transfer before overfill. These devices include level alarms, pump shut-off devices, and automatic control valves at tank inlets. Overfill can be avoided by checking tank volume prior to product transfer and monitoring the volume during the transfer operation.

RCRA regulations, 40 CFR 264.192, require the use of appropriate controls and practices on HW storage tanks to prevent overfilling. For uncovered tanks, the regulations require maintenance of sufficient freeboard to prevent overtopping by wave or wind action or by precipitation. While not specifically required under the CWA, overfill and transfer spill prevention systems are required for all HS tanks to comply with the intent of the law to prevent HS releases. The methods and equipment presented in this section have proven very effective in achieving this objective.

The complexity and cost of an overfill prevention system depends upon the potential effects of overfilling (rate of release, substance stored and hazards it poses, potential environmental effects, lack of secondary containment, etc.), and may be subject to the local enforcement agency approval. For instance, a small HW accumulation tank may require an operator with a dipstick or a level sensor/gauge to monitor the liquid level during loading operations. In contrast, a large industrial waste

treatment plant with various interconnected storage and process tanks may require computerized interlocking provisions for automatic shutoff.

5.10. TRAFFIC COLLISION PROTECTION 112.7(e)(3)(v)

Aboveground oil or HS pipelines can cause significant spills if ruptured, especially when product is flowing through the lines. Consequently, 40 CFR 112 requires that vehicular traffic should be warned verbally or by appropriate signs to be sure that the vehicle would not damage aboveground piping.

Warning signs should be placed at a height and location visible by truck drivers sitting in their truck. Warning signs at the entrance of an area should state the minimum clearance height of overhead pipelines. Similar signs should be placed at the approach to overhead pipelines. In addition to specifying the presence and location of pipelines, the signs should emphasize driver caution and observation of the speed limit.

A clearance bar or dangling chains located at the area entrance at a approximately 6 inches lower than the lowest overhead pipeline also warn a driver of a potential collision. At areas with large paved areas, the route to the loading racks should be painted on the pavement.

Dents, dings, and scratches in the equipment indicate damage by loading/unloading vehicles. Observing the transfer operations helps determine if adequate collision protection exists. As the vehicles approach and depart, there should be adequate clearances between the vehicles and equipment.

To reduce the potential for a traffic collision, physical barriers such as curbs and crash posts can be installed to protect pipelines. Physical barriers should protect tanks, pipes, pumps, racks, fill ports, valves, and other sensitive equipment. Traffic collision protection is a smart and cost-effective way of preventing costly spills and equipment damage.

Crash posts generally consist of brightly marked hollow steel posts filled with concrete. Crash posts should be located such that they protect the equipment involved without interfering with transfer operations. Figure 5-9 is an example of the use of crash posts. In this illustration, crash posts are located at a refueling point to protect the transfer equipment, yet they allow for the unimpeded movement of tanker trucks to the refueling points. Areas with massive equipment, such as cranes, may require crash posts as large as 1 to 3 feet in diameter to withstand a collision.

Crash posts are generally more economical than curbs. However, curbs may become more attractive when used for traffic collision protection and other purposes (secondary containment, site drainage, preservation of roadway foundation, etc.). Concrete curbing is an effective protective barrier at areas where vehicles are small or pipelines are less susceptible to collision. Figure 5-10 shows concrete curbs protecting fuel transfer equipment at a refueling point. The curbs protect the fuel meters, valves,

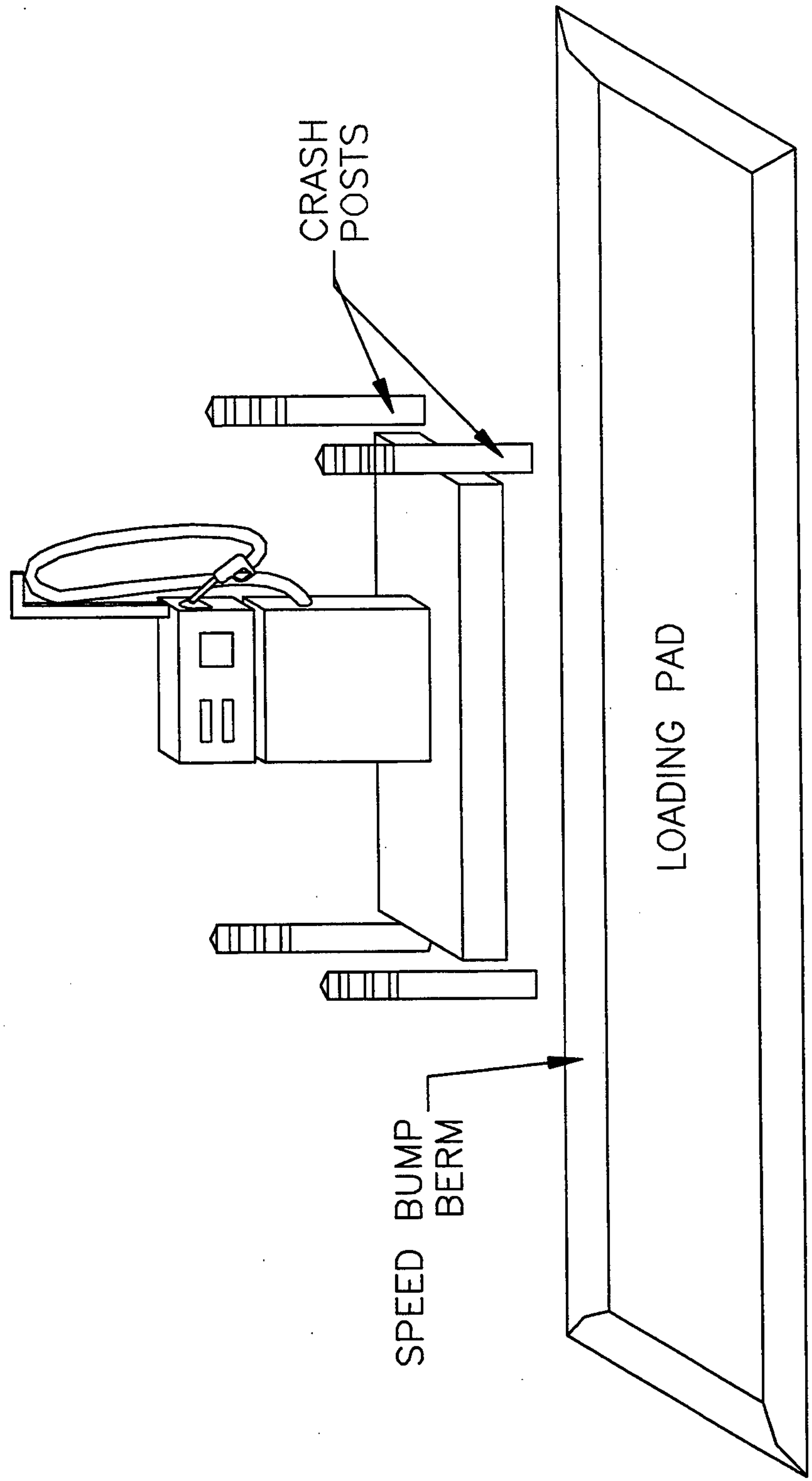


Figure 5-9
Use of Crash Posts

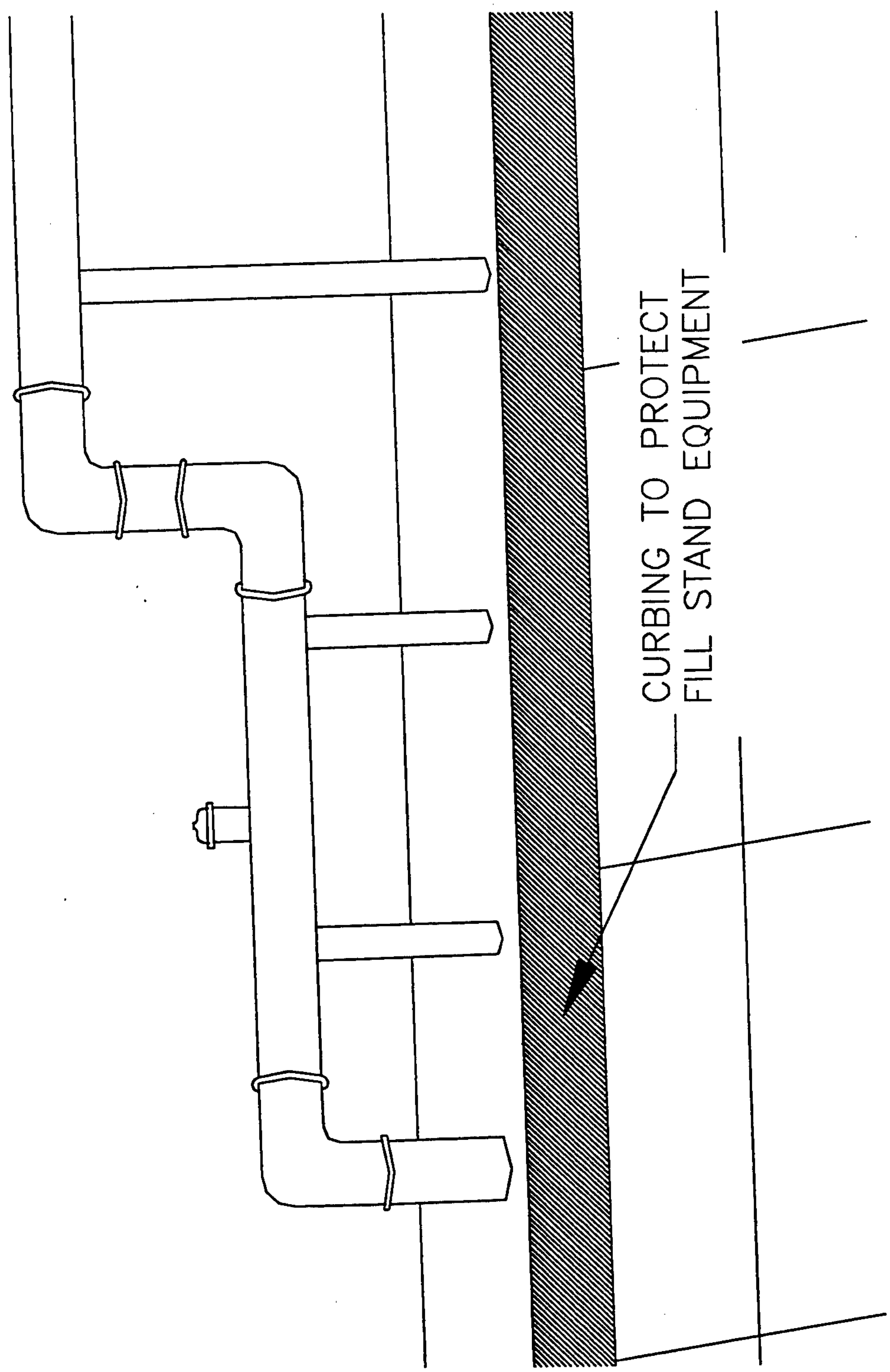


Figure 5-10
Use of Curbs to Protect Fuel Transfer Equipment

and other equipment on the fill stand. Curbing at loading racks is often incorporated into the curbing for spill containment (Chapter 7).

Where adequate clearance or protection cannot be provided, traffic may have to be rerouted. A final consideration may be to relocate a section of pipeline. However, because relocating a pipeline is costly and requires shutting down and purging the entire pipeline, this alternative is attractive only if other deficiencies require replacement.

5.11. VEHICLE POSITIONING AND EARLY DEPARTURE PREVENTION 112.7(e)(4)(iii)

Proper vehicle positioning at loading/unloading areas is essential to spill prevention. Vehicles should be parked in areas with secondary containment or flow diversion systems. Bulk transfer operations should be conducted only in areas equipped with such protection.

A vehicle leaving a transfer area before disconnecting hoses and securing valves is a common cause of spills; 40 CFR 112 recommends an interlocked warning light, physical barrier system, or warning signs at loading and unloading areas. Physical barriers and wheel chocks provide safeguards against accidental vehicle movement. Interlocked warning lights to prevent vehicular departure before complete disconnect of flexible or fixed transfer lines can also be used.

5.12. MARINE RECEIVING AREAS

Typical marine receiving areas include fuel piers and wharves designed for dispensing and receiving fuel. These areas have separate piping manifolds for each fuel type. Spill prevention for these areas are subject to U.S. Coast Guard regulations (33 CFR 154) and NAVFAC P-272. Pump stations associated with these areas should have some form of spill containment.

5.13. TANK CAR AND TANK TRUCK LOADING/UNLOADING RACK 112.7(e)(4)(i)

Tank car and tank truck loading/unloading operations should meet the minimum requirements established by the Department of Transportation (DOT). Applicable DOT requirements include 49 CFR Parts 177.834 and 177.837, which apply to the loading and unloading of hazardous and flammable materials. The National Fire Protection Association, Inc. (NFPA) also have established codes (NFPA 30) for loading and unloading operations for flammable and combustible liquids. DOT and NFPA requirements are procedural and have been incorporated into the SPCC standard operating procedures that are presented in Appendix G.

Even though these requirements are mainly procedural, they require the installation of some equipment. For example, bonding cables are necessary to conduct proper grounding, and a "NO SMOKING" sign reminds operators not to have open flames near the loading/unloading area. Briefly, the minimum DOT requirements include:

- Setting vehicle hand break.
- No smoking or open flame within 50 feet.
- Operating the equipment within eyesight and 25 feet of the loading rack.
- Properly training the operator to operate the equipment and to be aware of potential dangers.
- Stopping the engine, unless the motor is needed and in operation.
- Grounding the vehicle and the rack to the earth, and bonding the vehicle and rack to each other.

Refer to the text of 49 CFR 177 for additional information.

SPCC regulations suggest that areas not draining into a catchment basin should have a quick drainage system capable of holding the maximum capacity of any single compartment of a tank car or tank truck being loaded or unloaded. Section 7 discusses possible containment structures that may be used for this purpose.

CHAPTER 6

SPILL PREDICTION

6.1. INTRODUCTION 112.7(b)

To insure that adequate spill prevention, control, and countermeasures are in place, 40 CFR 112.7(b) states that a spill prevention, control, and countermeasures (SPCC) plan should include a prediction of the quantity of oil that could be spilled from an area and the behavior, direction, and rate of the spill. Area related guidance is a general SPCC guidance which addresses multiple regulations, not just 40 CFR 112. Regulations do not require that SPCC plans be prepared for stored hazardous substances (HS); however, spill prediction for HS should also be done as a best engineering practice. Chapter 3 discussed some of the typical causes of an oil or HS spill.

6.2. PREDICTING QUANTITY AND SPILL BEHAVIOR

The SPCC plan should identify the largest spill expected at each area. The maximum possible spill quantity at an area is the total capacity of the largest holding unit at the area: it is not the largest volume typically stored. Examples include the largest tank in a tank farm or the largest compartment of a tanker car or truck.

The behavior of spilled oil or HS is influenced by the type of material spilled, the cause of the spill, the features of the area, and the area surrounding the area. Table 6-1 identifies the various types of oils used by the Navy and various properties that affect spill behavior.

The direction in which a spill will spread is determined by natural and man-made drainage patterns that surround the area. Table 6-2 lists some of the items which can influence drainage patterns. During the preparation of the SPCC plan, these items should be noted as to the influence they will have on a spill leaving the area. By drawing an area site plot and depicting all the drainage influences, the path of a potential spill can be illustrated as in Figure 6-1.

Table 6-1
Properties of Petroleum Products Which Affect Their Spill Behavior

PERFORMANCE CRITICAL PROPERTY	DESCRIPTIVE PROPERTY	GASOLINE		TURBINE FUEL		FUEL OILS							LUBE OIL	HYDRAULIC FLUID	RELATIONSHIP OF PERFORMANCE PROPERTY TO SPILL
										Burner Fuels					
		MOGAS	AVGAS	JP-4	JP-5	Auto Diesel	Marino Diesel	Navy Distillate	Navy Special	No. 2	No. 5	No. 6			
Viscosity (centistoke) at 100°F	Resistance to flow	LOW	LOW	LOW	LOW	LOW (~1.4)	LOW (~3.0)	LOW (~10)	HIGH	LOW (~2.0)	HIGH (>75)	HIGH (>75)	MOD - HIGH	-	Low viscosity materials spread easily over surface
Surface Tension	Resistance to spread over another liquid	LOW	LOW	LOW	LOW	MOD	MOD	MOD	MOD	MOD	MOD	MOD	MOD	LOW	Low surface tension materials will spread more readily
Volatility	Tendency to evaporate	HIGH	HIGH	HIGH	LOW	LOW	LOW	LOW	LOW	LOW	VERY LOW	VERY LOW	VERY LOW	MOD	High volatility favors evaporation - if combined with low flash point, present explosion hazard
Relative Solubility	Tendency for all or portion of spill to dissolve in water	VERY LOW	VERY LOW	VERY LOW	VERY LOW	VERY LOW	VERY LOW	VERY LOW	VERY LOW	VERY LOW	VERY LOW	VERY LOW	Emulsifies	-	Soluble component of spill (including additives) may be toxic to aquatic organisms
Density (specific gravity) approx.	Mass per unit volume - tendency to sink in water	LOW (~.73)	LOW	LOW	LOW (~.80)	LOW (~.85)	LOW	LOW	MOD (~.95)	LOW (~.82)	MOD (.96)	HIGH (.9 - 1.0)	MOD (.85)	-	Materials heavier than water (Sp Gr = 1.0) generally will sink - smother bottom organisms - affect shellfish
Emulsibility	Tendency to form stable suspension with water	VERY LOW	VERY LOW	VERY LOW	VERY LOW	LOW	LOW	LOW	HIGH	LOW	HIGH	HIGH	HIGH	HIGH	High emulsibility spreads oil throughout water column, extends possible contamination range. Affects free swimming species (fish)
Pour Point (max)	Lowest temperature at which oil will pour	LOW	LOW	LOW	LOW	LOW	LOW (20°F)	-	LOW (15°F)	LOW (20°F)	LOW	HIGH (60°F)	LOW (~10°F)	-	As pour point is approached, spill spread decreases
Flash Point (min)	Tendency to ignite	VERY LOW (~40°F)	VERY LOW	VERY LOW (~20F)	MOD (~140°F)	LOW (~104°F)	MOD (~140°F)	MOD (~150°F)	MOD (~150°F)	LOW (100°F)	MOD (130°F)	MOD (150°F)	VERY HIGH (350°F)	HIGH	Low flash point combined with high volatility - explosion hazard
Applicable Specification(s)		VV-G-001690A MIL-G-3056C VV-G-76-B	MIL-G-5572E	MIL-T-5264J		VV-800(B)	MIL-F-16884G	MIL-F-23497	VV-F-859-E	VV-F-815-C			MIL-L-17331F MIL-L-9000G MIL-L-22851D	MIL-H-22072A MIL-H-5606C	Note: Range should be read relative to descriptive property MOD - moderate range

Table 6-2
Items Which Influence Drainage Patterns

• Ground Slope or Grade	• Ground Condition:
• Streams, Creeks and Rivers	Loose Soil
• Dry Creek Beds	Hard Soil
• Hills	Asphalt
• Spill Containment Structures	Concrete
• Curbs	Grass
• Ditches	Thick Weeds
• Sanitary Sewers	Sand
• Storm Sewers	Rocks
• Floor Drains	

6.3. OIL SPILL MODEL SYSTEM

When oil is spilled in the marine environment, a concern is where the oil will migrate. There are several computer-based oil spill model systems suitable for use in spill response and contingency planning.

Oil spill modeling systems provide rapid predictions of the movement of spilled oil. The systems include simple graphical procedures for entering data specifying the spill scenario. The oil spill model predicts the surface trajectory of spilled oil for either instantaneous or continuous release spills.

Additional model features include estimating the spill paths on a monthly, seasonal, or annual basis. Output includes maps showing probabilities of oiling the water surface and nearby shorelines. Results are used to determine the probability of oiling biological, industrial, or archaeological resources.

Software available for performing oil spill modeling includes OSIS™, the trade name for an oil spill model now marketed by BMT®, OILMAP®, and SIMAP®.

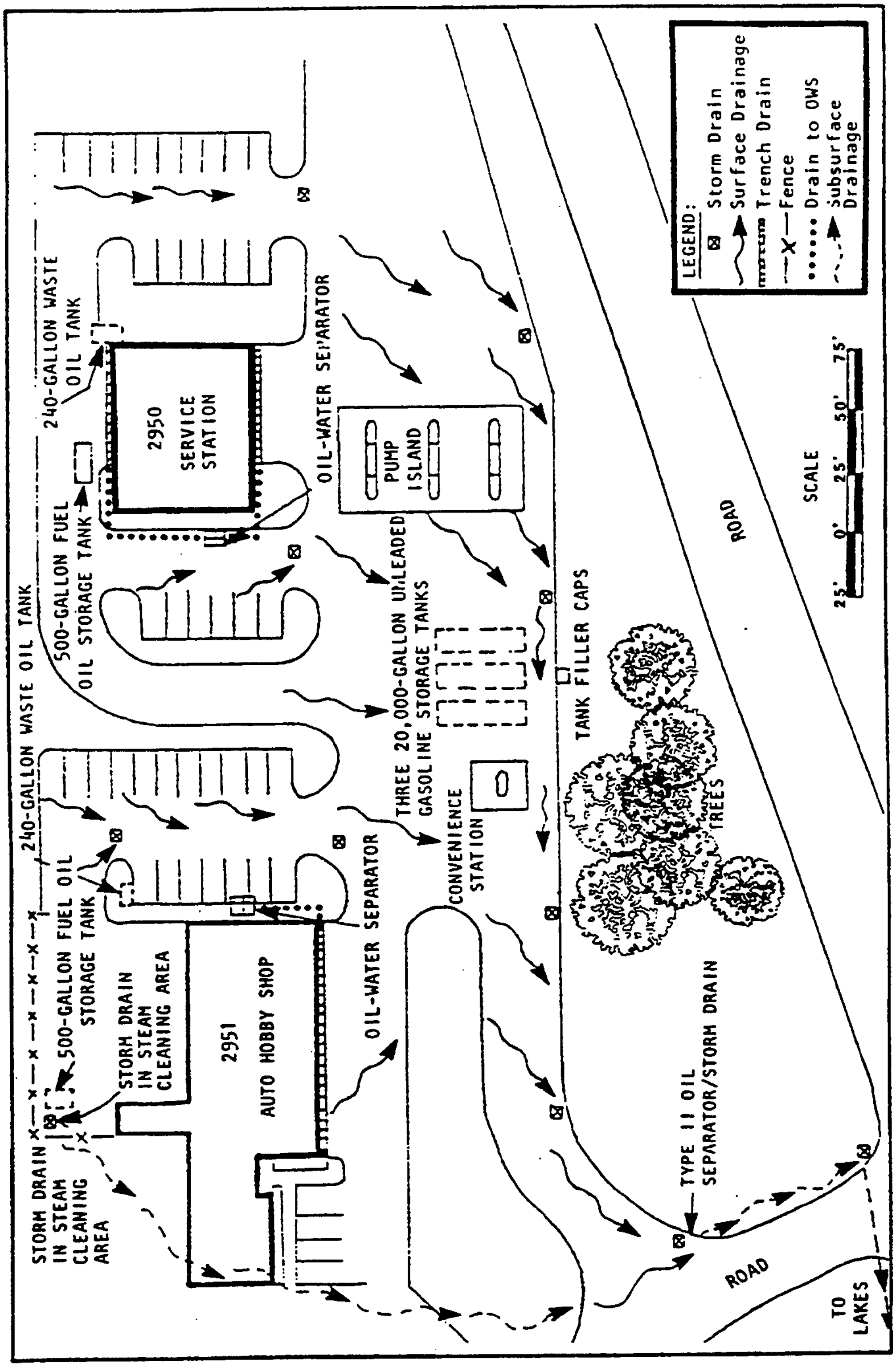


Figure 6-1
Spill Path Prediction

CHAPTER 7

SPILL CONTAINMENT

7.1 INTRODUCTION

Spill containment structures and equipment should prevent spilled material from leaving an area by physically confining the material at the source, diverting it to containment, or returning it to the original area. Areas storing or handling oil that lack secondary containment are in violation of 40 CFR 112.7(c); areas storing or handling HW that lack secondary containment are in violation of 40 CFR 264 and 265; areas storing PCBs prior to disposal without secondary containment are in violation of 40 CFR 761.65; and HS areas without secondary containment are at risk of creating a spill that can contaminate the surrounding soil and waterways.

Design parameters for spill containment structures must be evaluated for compatibility with the type and volume of the material stored. These parameters include:

- Containment Capacity
- Structural Strength
- Impermeability
- Structural Integrity

This chapter provides guidance to identify and evaluate deficiencies related to these parameters. Spill control structures must comply with the performance requirements identified in this chapter. Actual field conditions may determine the corrective actions needed to satisfy the regulatory requirements. Area related guidance is a general SPCC guidance that addresses multiple regulations, not just 40 CFR 112. Good engineering judgment should be exercised when deciding the need for and extent of repair of deficient structures. Navy design manuals and other design standards are referenced for comparison purposes only and deviations from these standards may be warranted.

7.2 SPILL CONTAINMENT SYSTEMS 112.7(c)

Secondary containment should be provided for all areas and equipment, regardless of the type(s) of structure(s) involved, having the potential for significant releases of oil to the environment (40 CFR 112.7(c)) and for HW tank systems and container storage areas (40 CFR 264.175, 264.193, and 265.193) and should be provided for areas storing HS. 40 CFR 280 requires secondary containment for USTs storing HS. Oil areas with a reasonable potential creating of a spill that may impact navigable waters require secondary containment. Spills can impact navigable waters through spills direct discharge into a body of water, from discharge into storm sewers or ditches, or from spills that seep into the ground. All areas with a reasonable spill potential should be checked to determine if secondary containment is needed.

Spill containment structures and equipment must be designed, maintained, and operated properly to prevent discharged oil or HS from reaching a navigable waterway. Preferably, spills should be controlled by spill containment structures immediately adjacent to the potential spill source. However, if this is not possible due to site constraints, then diversionary structures (culverts, gutters, etc.) can direct spills to a remote containment or treatment area. Holding or storage basins and ponds are typically used for remote secondary containment of large spills.

Spill containment structures include dikes, retaining walls, berms, curbs, catchment basins, quick drainage systems, trenches, retention ponds, double walled tanks, or a combination of these structures. Dikes and retaining walls are typically used with aboveground storage tanks; double-walled tanks are typically used for underground storage tanks. Curbs, berms, catchment basins and quick drainage systems are commonly used for loading/unloading areas. Gravity drainage to an oil-water separator can contain and collect relatively frequent but small oil spills in loading and dispensing areas.

40 CFR 112 also allows sorbents, drip pans, and booms to be used as containment systems. Sorbents and drip pans are commonly used to contain small spills around pumps, filters, valves, and other pieces of equipment. Booms can be placed at a storm water outlet as a precautionary measure to catch any oil before it enters a navigable waterway.

If secondary containment is not feasible due to space limitations, the SPCC plan must demonstrate the impracticality. A strong spill contingency plan must be prepared which outlines the resources committed and the methods and procedures to contain, control, and remove any harmful releases. However, the regulatory agency may not agree with the rationale and may still require the installation of secondary containment, even though major site modifications may be required.

This section addresses the various types and applications of these containment systems to the various potential spill sources at a Navy facility.

7.2.1 Dikes, Berms, and Retaining Walls

112.7(c)(1)(i)
112.7(e)(2)(ii)
112.7(e)(2)(xi)

Dikes, berms, and retaining walls are normally used in areas with the potential for large spills, such as single or multiple aboveground storage and processing tanks.

Requirements for dikes are specified in DM-22. To evaluate the adequacy of a spill containment dike, review the following criteria: capacity, material of construction and compatibility with tank contents, integrity, and strength.

Figure 7-1 is an example of a dike used at a fuel farm, and Figure 7-2 is a cross section of such a dike. Where space allows, lined earth dikes are preferred over concrete walls per DM-22. Dikes commonly have sloped walls so that the base of the dike is much wider than the crown or top. The slopes of earth dikes should not be steeper than 1 foot vertical to 1-1/2 feet horizontal. On average, dikes are not to exceed an interior height of six feet. In addition, it is good practice to construct dikes with level, three-foot wide surface on the crown to provide a walking surface for inspections. Dikes are typically constructed of well-compacted earth and coated with reinforced concrete, asphalt with rubberized coal tar sealer, or bentonite for erosion control and to provide an impervious surface. Table 7-1 presents a comparison of various materials used for the construction of containment structures (permeability, resistance to erosion, strength, cost, etc.).

A reinforced concrete retaining wall is used when space is not available for a dike. Retaining walls are usually constructed of either reinforced concrete blocks or reinforced poured concrete.

Concrete block retaining walls have a few drawbacks:

- They have a height limitation of 3 or 4 feet, in order to withstand potential fluid loads.
- Settling separates the blocks and may even crack them, destroying the integrity of the containment wall.
- They require an epoxy coating due to the porosity of the blocks.
- Spalling of the mortar between the walls can destroy the liquid-tightness of the wall.

Due to the limitations of concrete block walls, poured reinforced concrete walls are the preferred alternative. A reinforced poured concrete retaining wall can be used when the height needed for a containment wall exceeds the 3 to 4 foot height limitation of concrete block walls. Figure 7-3 illustrates a typical concrete dike. Figure 7-4 depicts the use of a retaining wall around a small aboveground tank. Figure 7-5 illustrates the construction of a concrete retaining wall.

The area within the dike should be sloped to carry drainage away from the tanks to a drain or sump located at the low point of the enclosure. Drainage from the sump to

the outside of the enclosure should be controlled by a lock-type gate valve located outside of the enclosure and in a location that will be safely accessible during a fire.

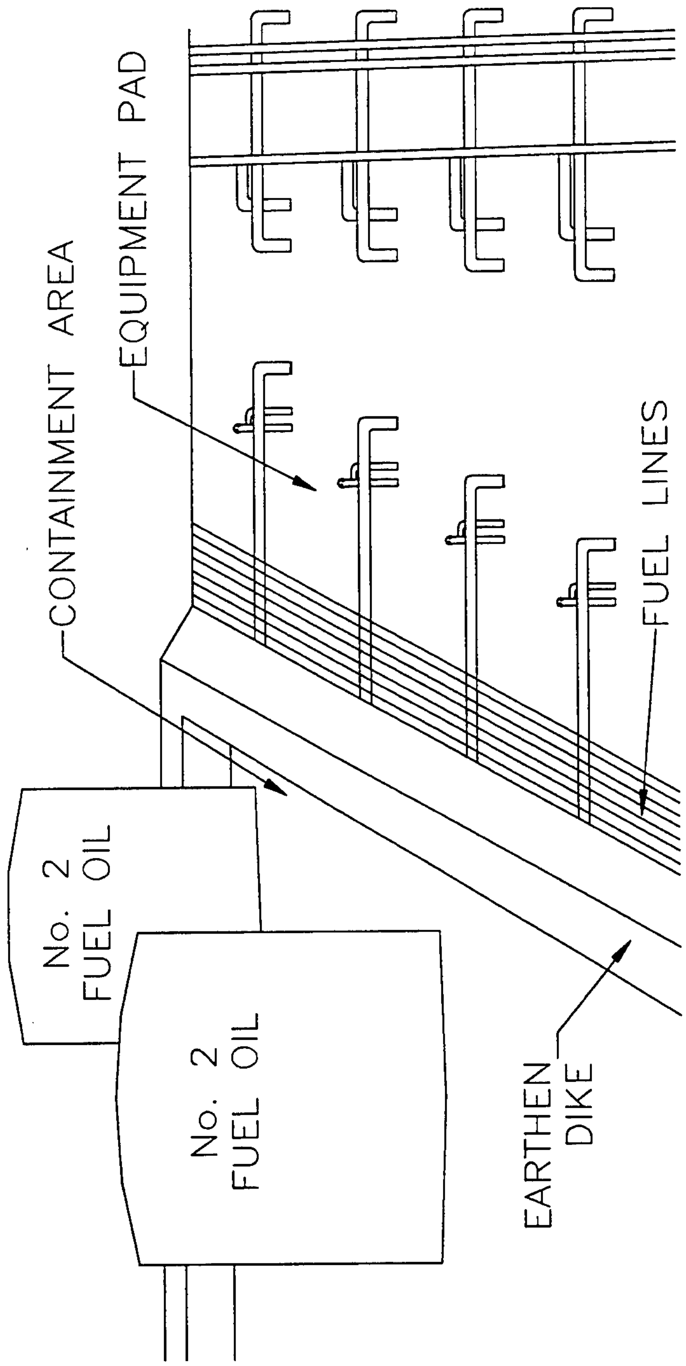


Figure 7-1
Typical Diked Area

The drain valve should be normally closed and only be opened for draining water from the diked basin.

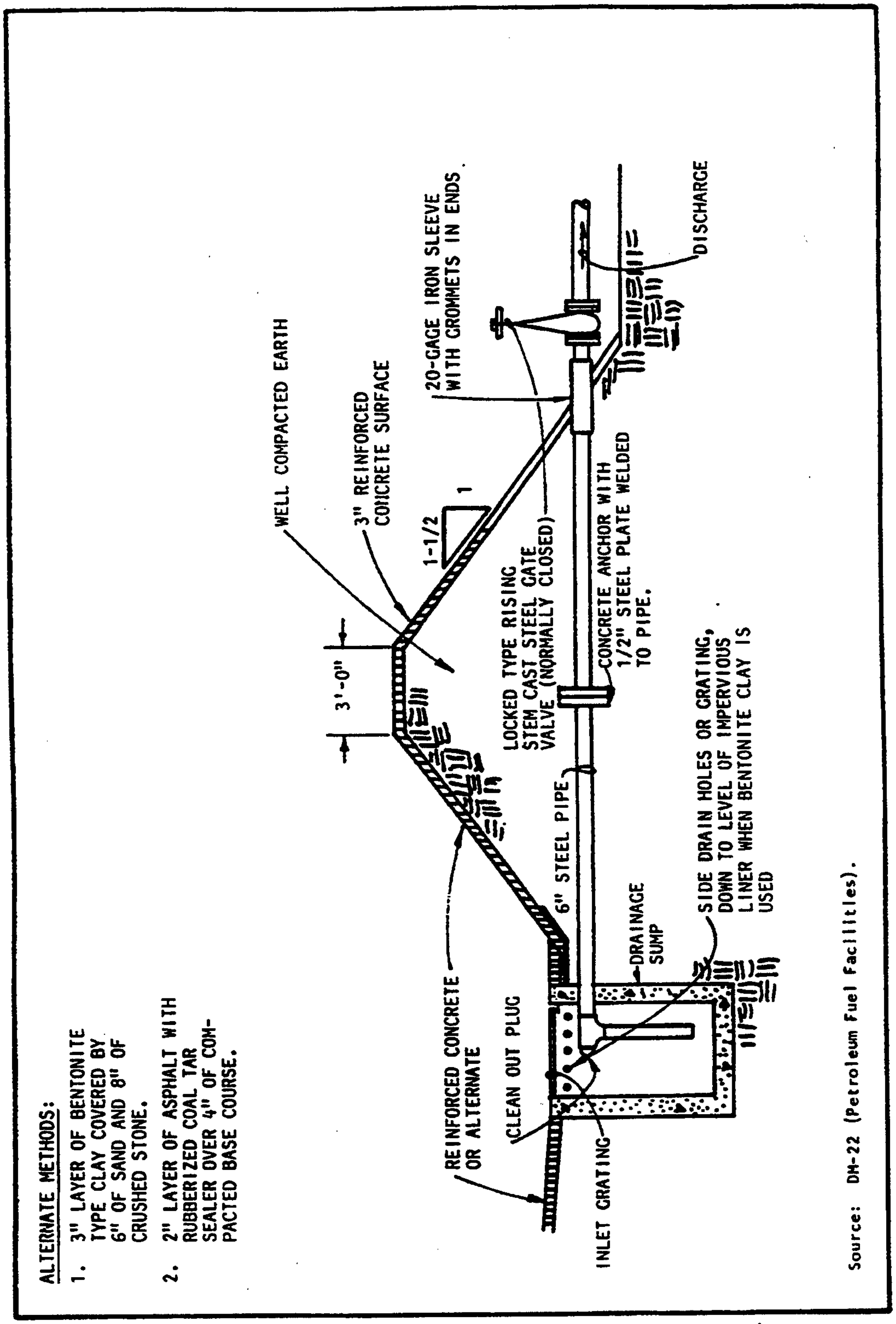


Figure 7-2
Cross Section of Typical Dike

Table 7-1
Characteristics Of Construction Materials
Used For Containment Structures (Dikes)

Material	Permeability	Resistance to Erosion Weathering	Resistance to Weed Growth	Strength	Chemical Compatibility	Maintenance Requirements	Capital Cost
1. Earthen Dikes							
• Natural Soil	H	L	L	L/M	H	H	L
• Clay Core	L	L	L	M	H	M	L
• Clay Cap or Cover	L	M	L	M	H	H	M
• Asphalt Cover	L*	H	H	M	L/H*	M	M
• Synthetic Membrane	L	M	M	M	H	M	M
• Cement Mortar Cover	L	H	H	M	H	L	H
2. Reinforced Concrete Dikes	L	H	H	H	H	L	H
3. Concrete Block Dikes	M/H	H	H	M	M	L	M

H = High
M = Medium
L = Low

7.2.2 Curbs

112.7(c)(1)(ii)

Curbs are a very effective means of secondary containment around drum storage areas, product dispensing areas, bulk loading and unloading areas, and pump equipment areas. Curbing can be used where only small spills are expected. Curbing can also be used to direct spills to drains or catchment systems. Curbed areas typically consist of a reinforced concrete or asphalt apron surrounded by a concrete curb. Curbs can be of a uniform rectangular cross section or combined with mountable curb sections to allow access to loading/unloading vehicles and material handling equipment. Standard and mountable curb sections are shown in Figure 7-6. Typical applications of curbs are illustrated in Figure 7-7 through Figure 7-9.

The flooring should be sloped so that any oil or rainfall flows to a collection point. Figure 7-10 illustrates the use of a curb and a sloped floor to direct spills at a loading and unloading rack to the spill containment area drain.

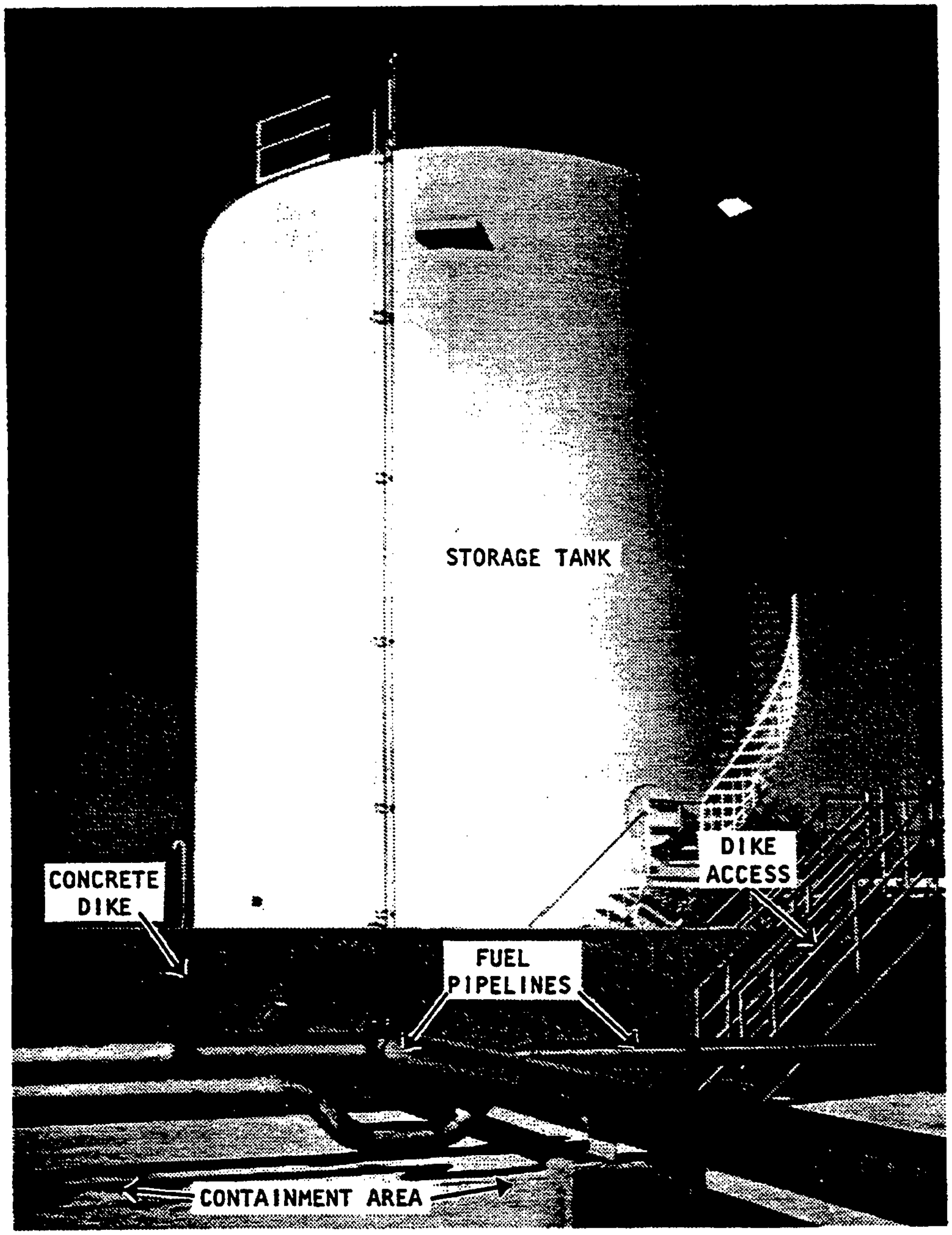


Figure 7-3
Typical Concrete Dike

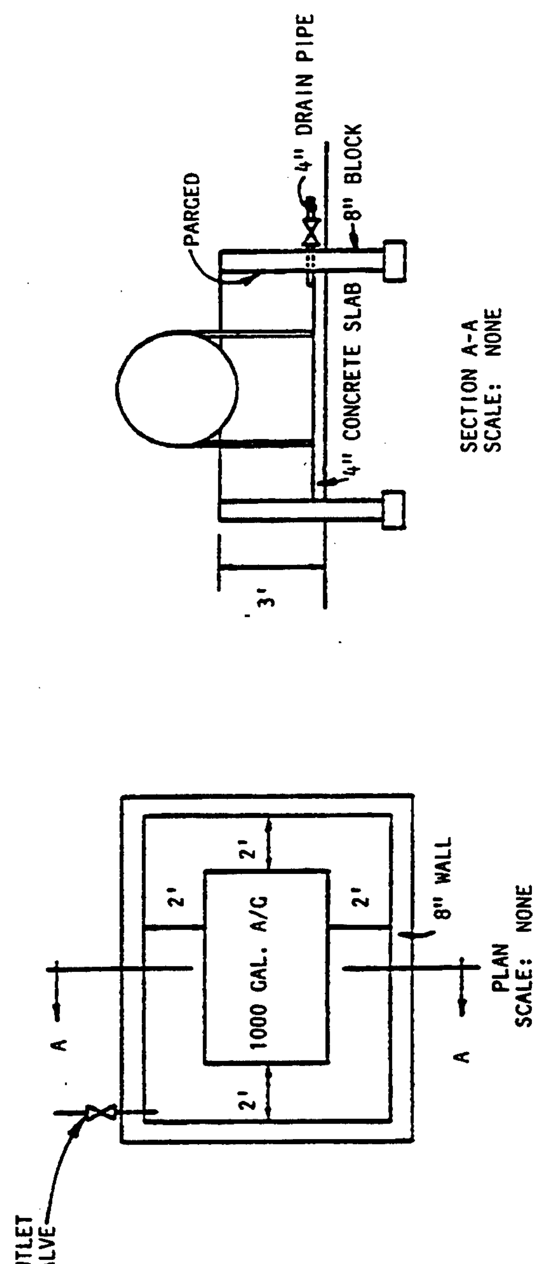
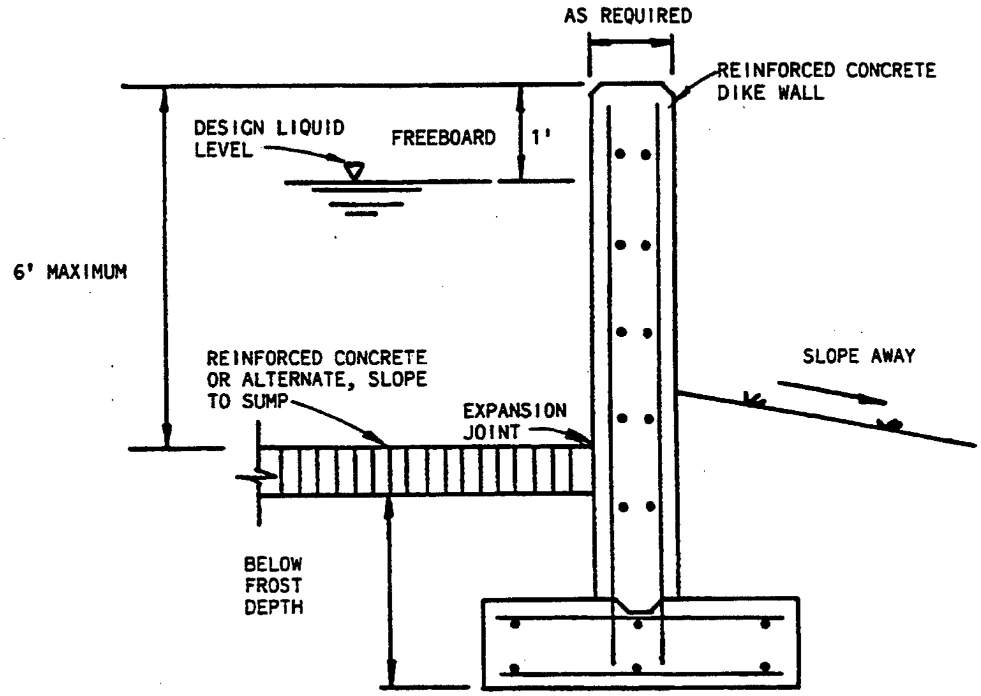


Figure 7-4
Use of Retaining Wall for Small Aboveground Tank

ALTERNATE METHODS:

1. 3" LAYER OF BENTONITE TYPE CLAY/SOIL MIXTURE, COVERED BY 6" OF SAND AND 8" OF CRUSHED STONE.
2. 2" LAYER OF ASPHALT WITH RUBBERIZED COAL TAR SEALER OVER 4" OF COMPACTED BASE COURSE.



NOTES:

1. SIZE FOOTINGS, WALL SECTIONS AND REINFORCEMENT TO RESIST STATIC AND HYDROSTATIC FORCES.
2. PROVIDE EXPANSION JOINTS AT STRUCTURAL INTERFACES AND AS NEEDED FOR WALL EXPANSION AND CONTRACTION.
3. JOINT MATERIAL MUST BE SUITABLE FOR USE WITH OILS.

Source: DM-22 (Petroleum Fuel Facilities).

Figure 7-5
Construction of Typical Retaining Wall

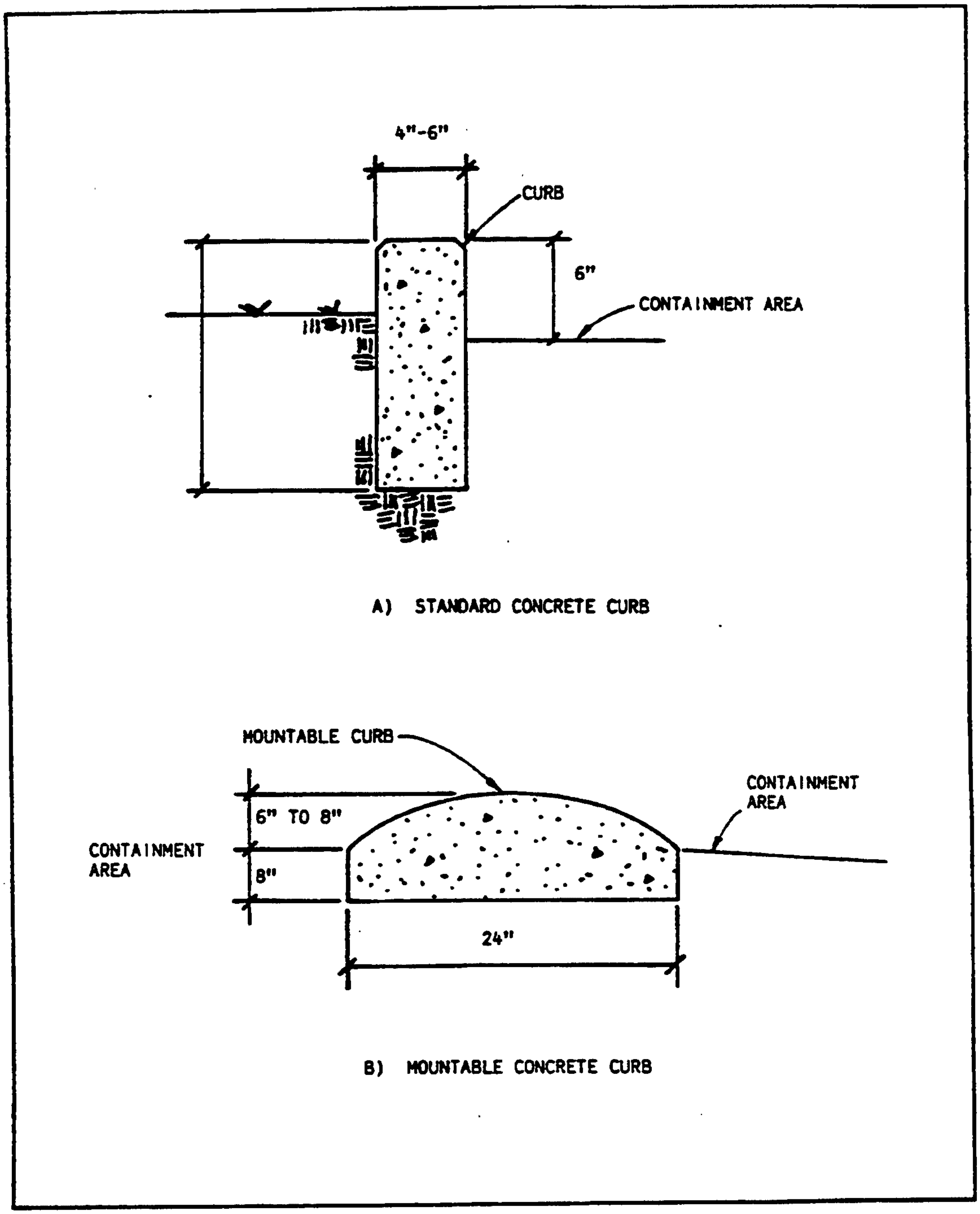


Figure 7-6
Typical Concrete Curb Sections

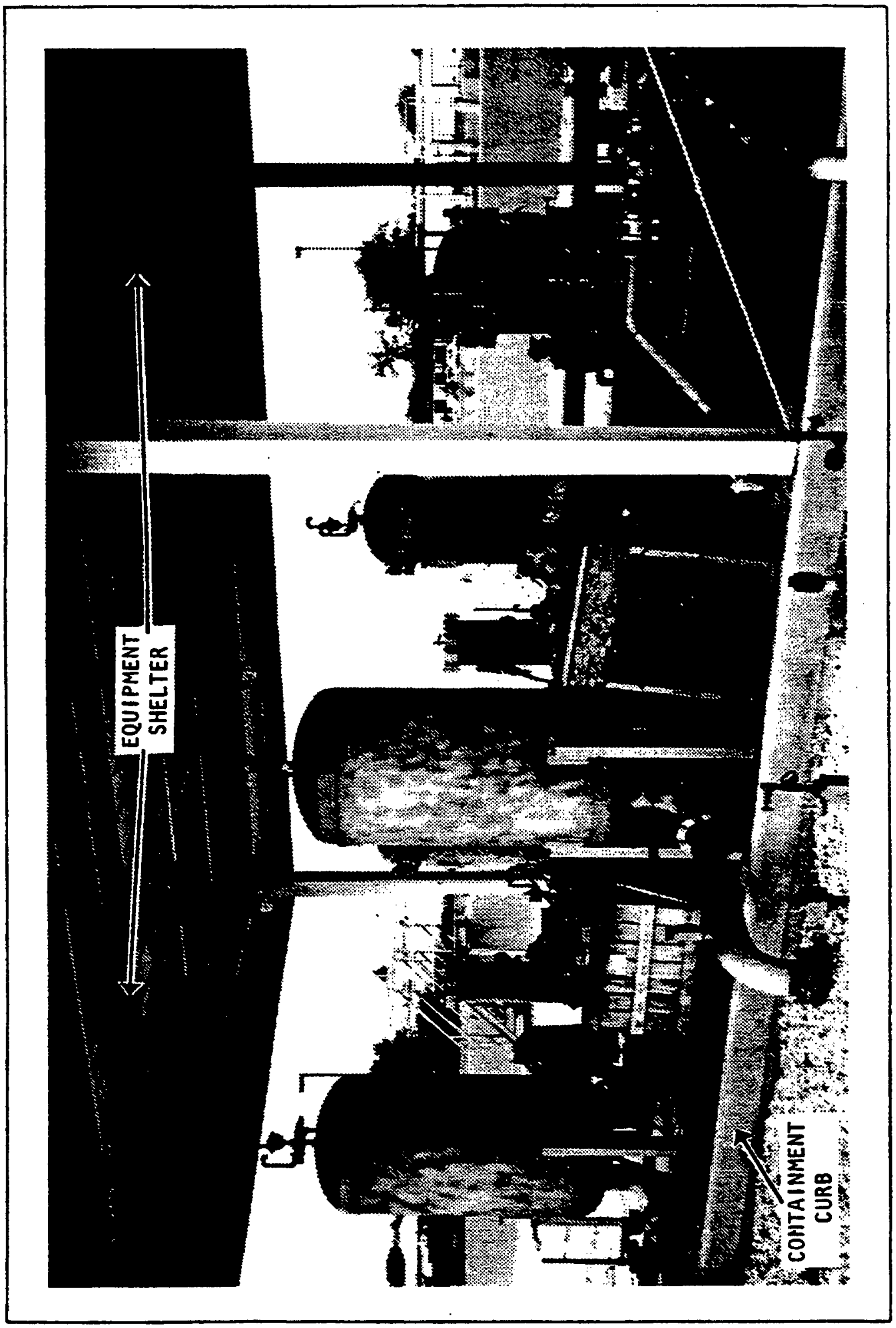
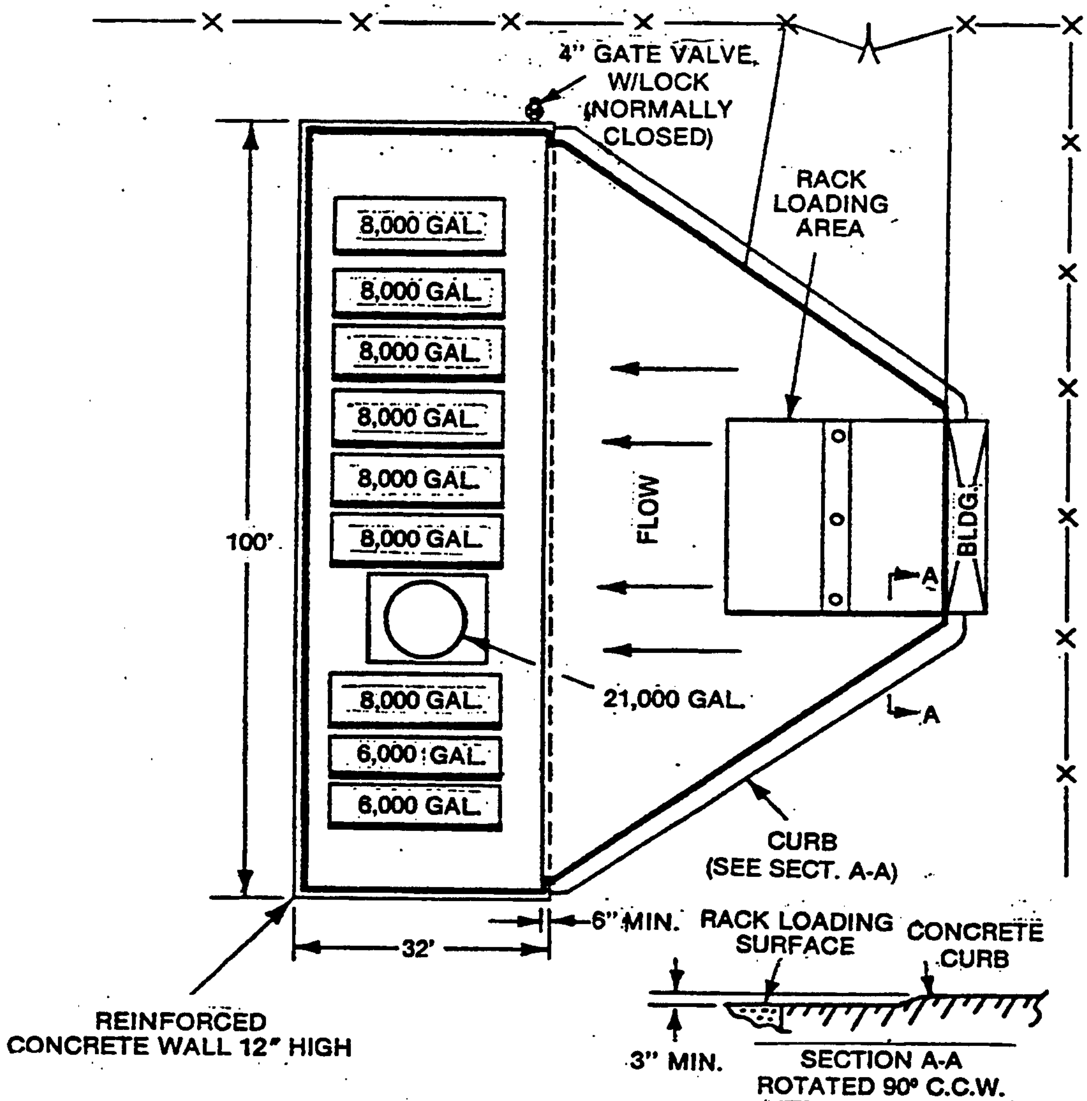


Figure 7-7
Example of Containment Curb in Equipment Shelter



NOTES:

1. SECONDARY CONTAINMENT IS AREA SHOWN INDICATED BY HEAVY LINE.
2. DIKE AROUND RACK AREA SHALL CAUSE DRAINAGE/SPILLS TO FLOW INTO TANK CONTAINMENT AREA.

Figure 7-8
Example of Containment Curb at Loading Rack and Storage Tanks

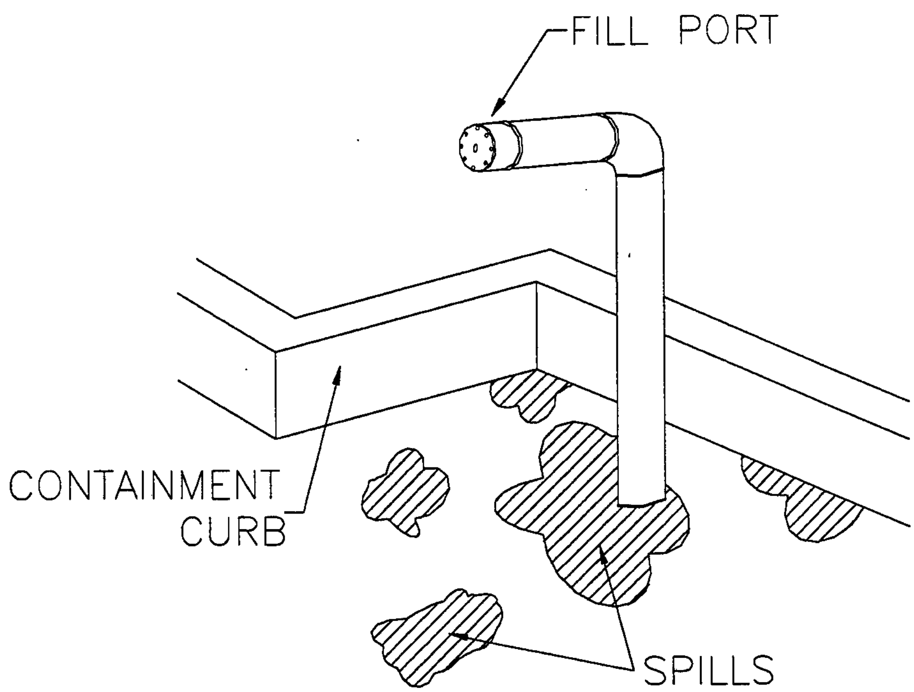


Figure 7-9
Example of Containment Curb Used at Fill Port

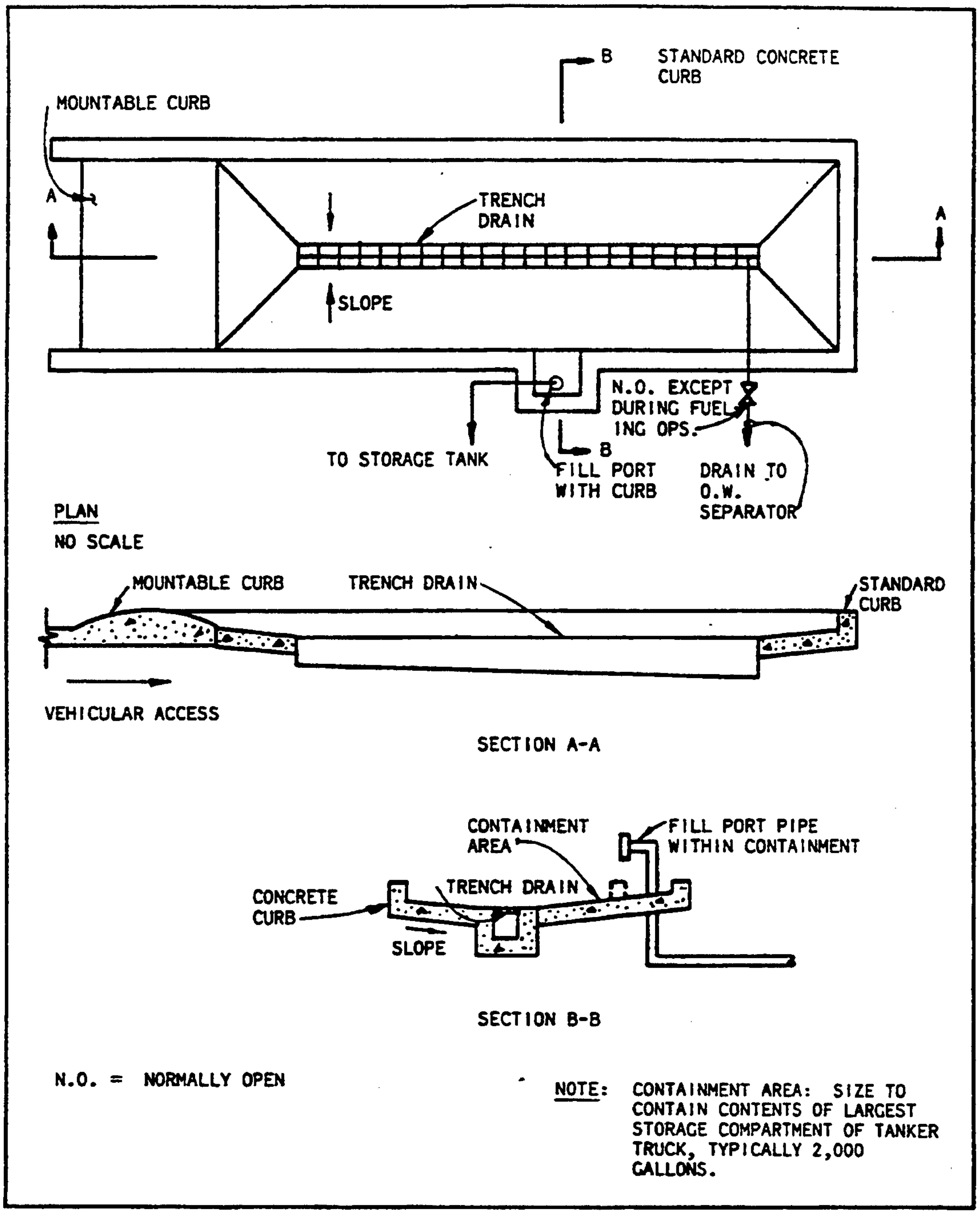


Figure 7-10
Example of Curbing and Drainage

7.2.3 Quick Drainage Systems

112.7(e)(4)(ii)

When a potential spill at a loading or unloading rack cannot be drained by gravity to a catchment basin or a treatment plant, an automatic pump must be used to transfer the material. Such an arrangement is called a quick drainage system and is shown in Figure 7-11. The pump for a quick drainage system is located in a small catchment basin or sump. The quick drainage system pumps the spilled fluids to another catchment basin, tank, or treatment system. Figure 7-12 illustrates the use of a quick drainage system at a bulk fuel storage area.

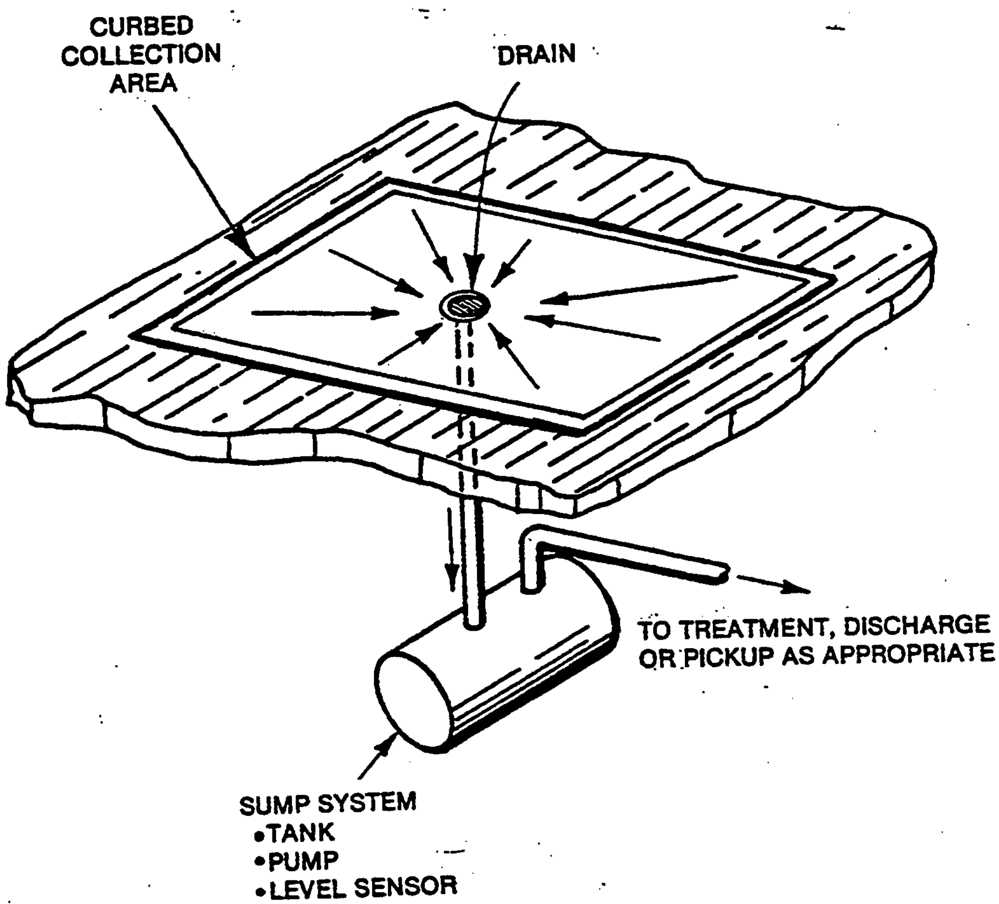


Figure 7-11
Quick Drainage System

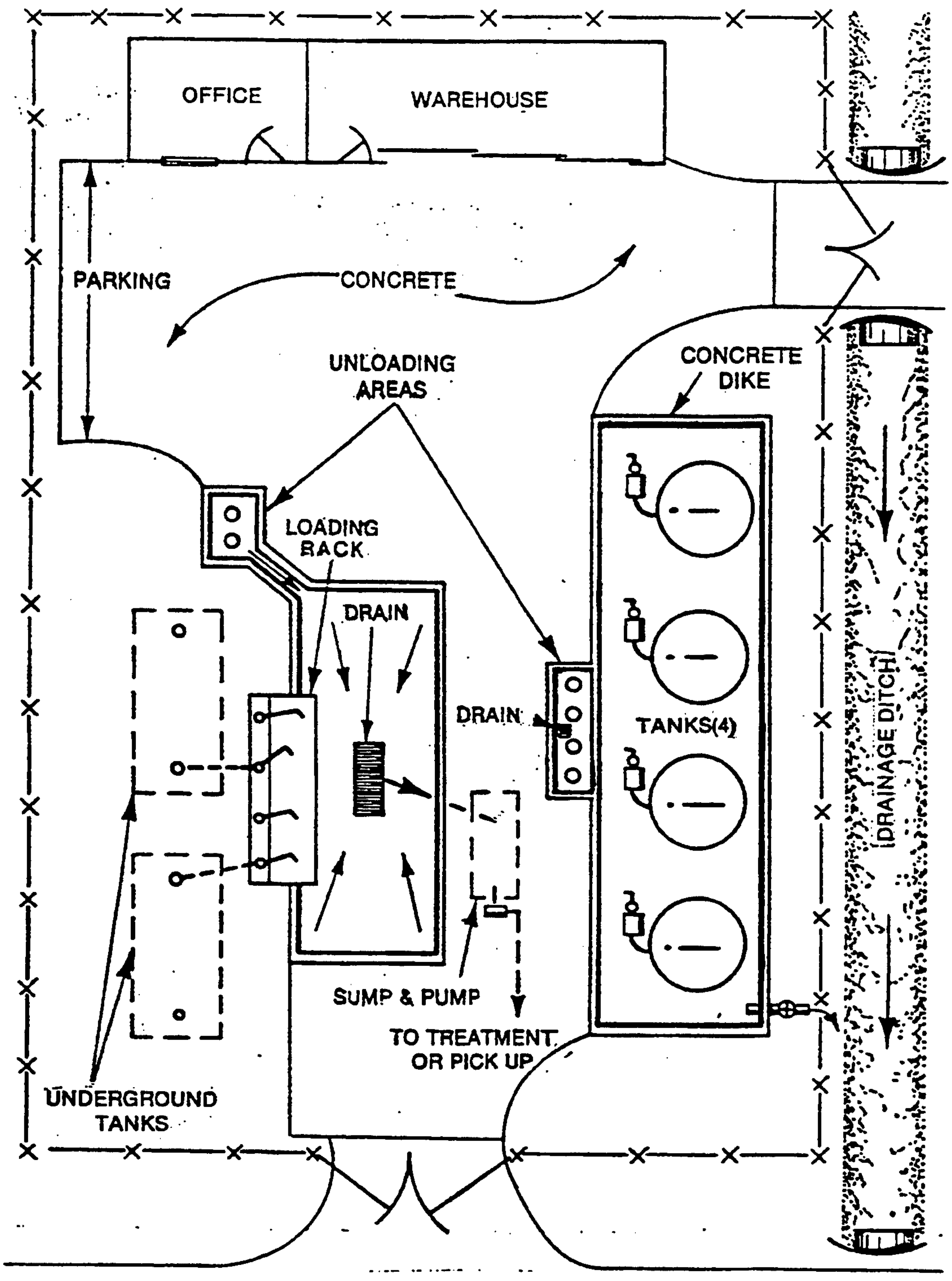


Figure 7-12
Use of Quick Drainage System at Bulk Fuel Storage Area

The design of a quick drainage system must allow for collection and treatment of rainwater that will collect in the system. During a rainstorm the basin, trench, or tank could overflow. Additionally, rainwater standing in the basin, trench or tank will reduce the containment capacity of the system.

7.2.4 Trenches, Retention Ponds, and Surface Impoundments

112.7(c)(1)(iii), (v), and (vi)
112.7(e)(1)(iii) and (iv)

Secondary containment, such as dikes, is not always feasible; drainage trenches, culverts, sewers, swales, or gutters that direct a spill to a retention pond or catchment basin are acceptable alternatives. Closed systems, such as pipelines, should be used for volatile compounds rather than open drainage ditches. Drainage from undiked areas should, if possible, flow into retention areas designed to retain spills or return the material to activity property. Retention ponds and basins should not be located in flood plains or areas subject to flooding. Information regarding flood plains is available from the U.S. Geological Survey, the Corps of Engineers, or local government agencies.

Surface impoundments present significant potential for water and groundwater contamination due to seepage or overflow and must be properly designed. Also, leaks are difficult to detect and expensive to correct; therefore, RCRA requirements impose very strict design and operation standards. Surface impoundments can contain spills if the area is designed to treat the spilled material or collect it and return it to the area. If hazardous wastes are collected or treated in the surface impoundment, then the impoundment is strictly regulated under 40 CFR 264.220 (RCRA); surface impoundments also require a Part B Permit to operate.

Containment structures in an environmentally sensitive area may not always be the most practical means of spill containment. Figure 7-13 illustrates the use of a diversion trench or depression to intercept spills from an aboveground pipeline rupture. Figure 7-14 shows a diversion trench that directs surface spills to a retention basin.

Trenches, drainage ditches, and sewers segregate stormwater run-off from chemical storage, transfer, process, and other areas to prevent commingling run-off. Diversion and drainage structures also segregate individual operations to contain spills and prevent incompatible mixing. Figure 7-15 illustrates a typical diversion trench in a containment area. The diversion trench separates the drainage from the two tanks and minimizes the potential spill area associated with each tank. This is a recommended practice when several tanks are within one containment area, such as a tank farm.

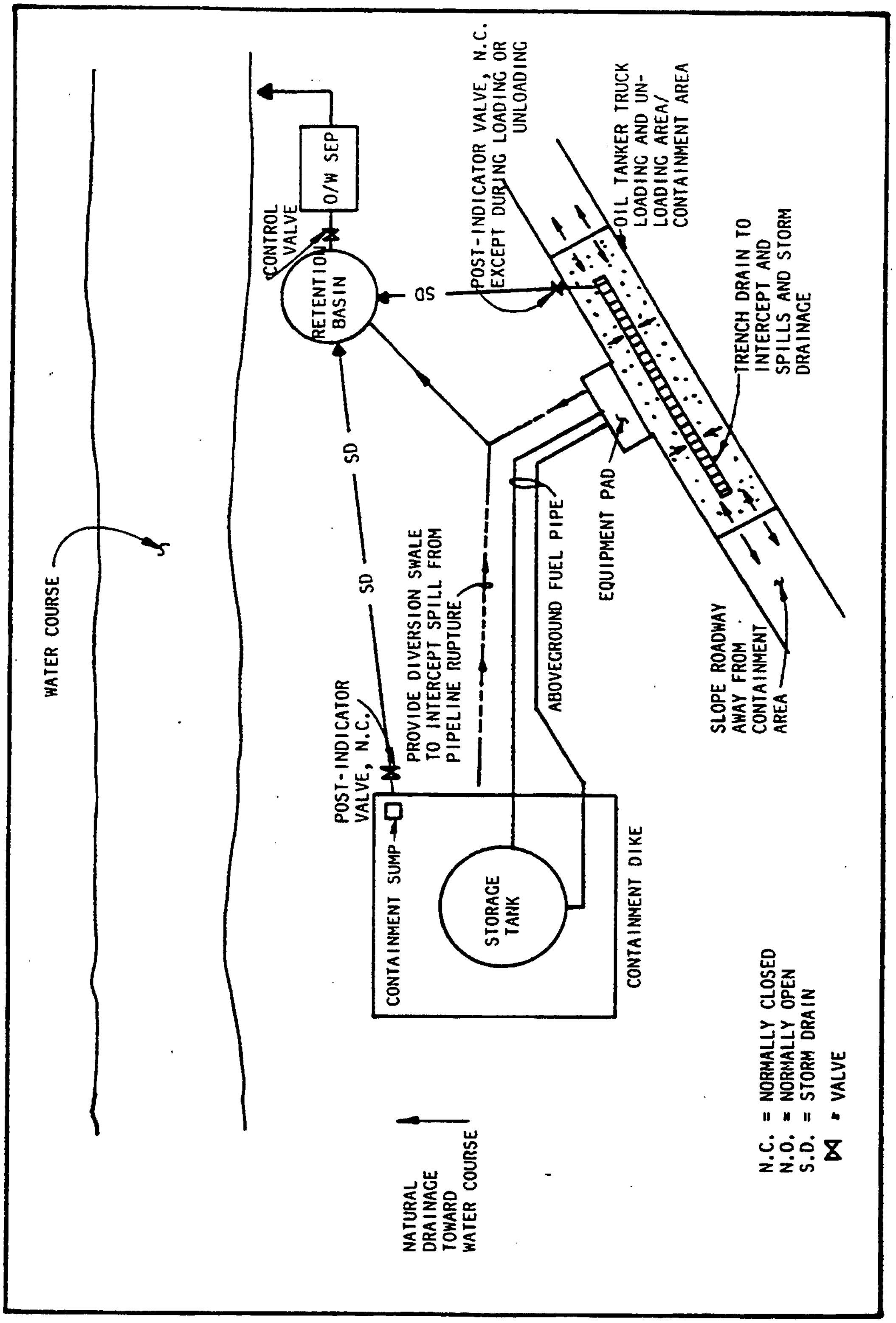


Figure 7-13
Use of Diversion Trench for Aboveground Pipeline

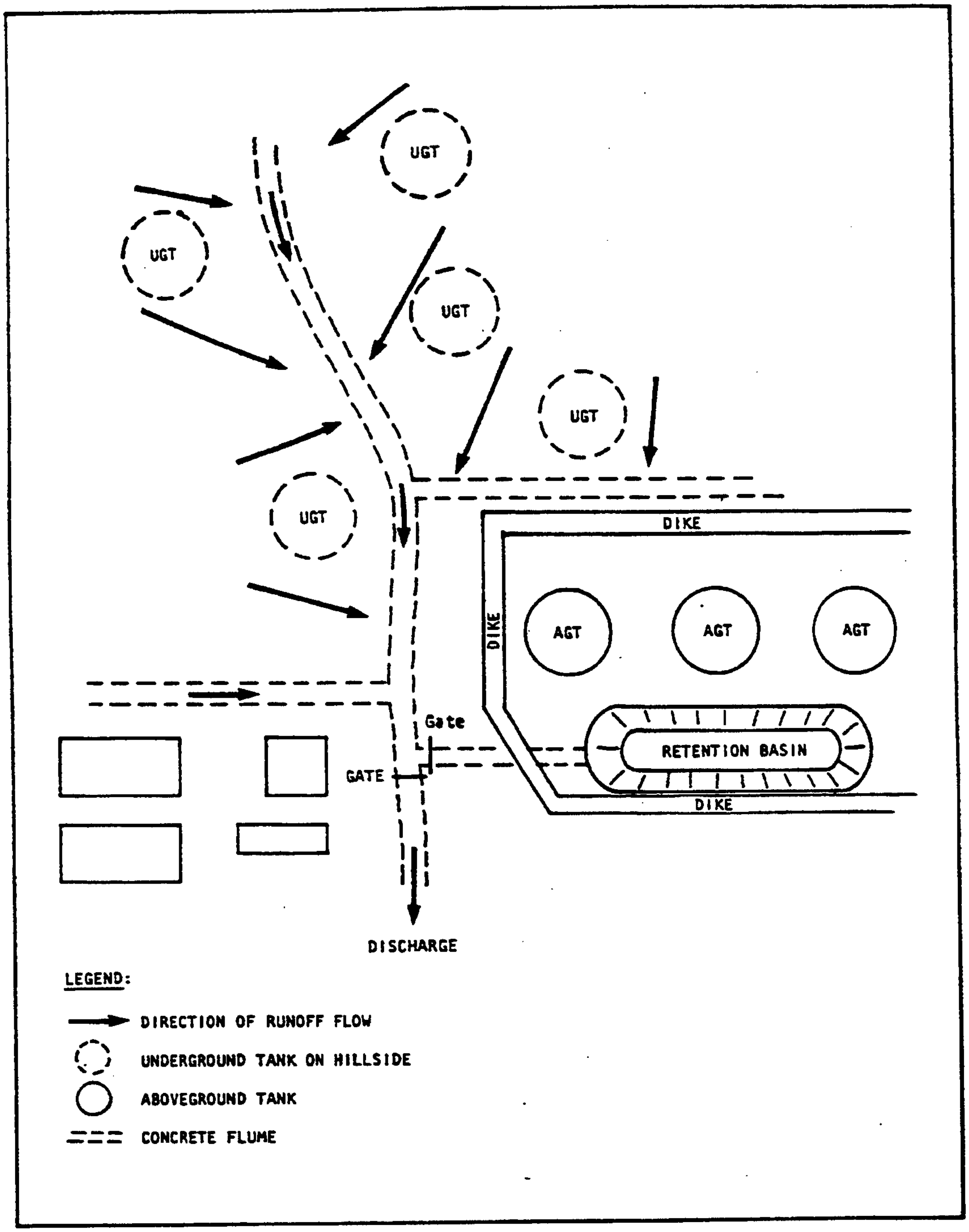


Figure 7-14
Typical Diversion Trench

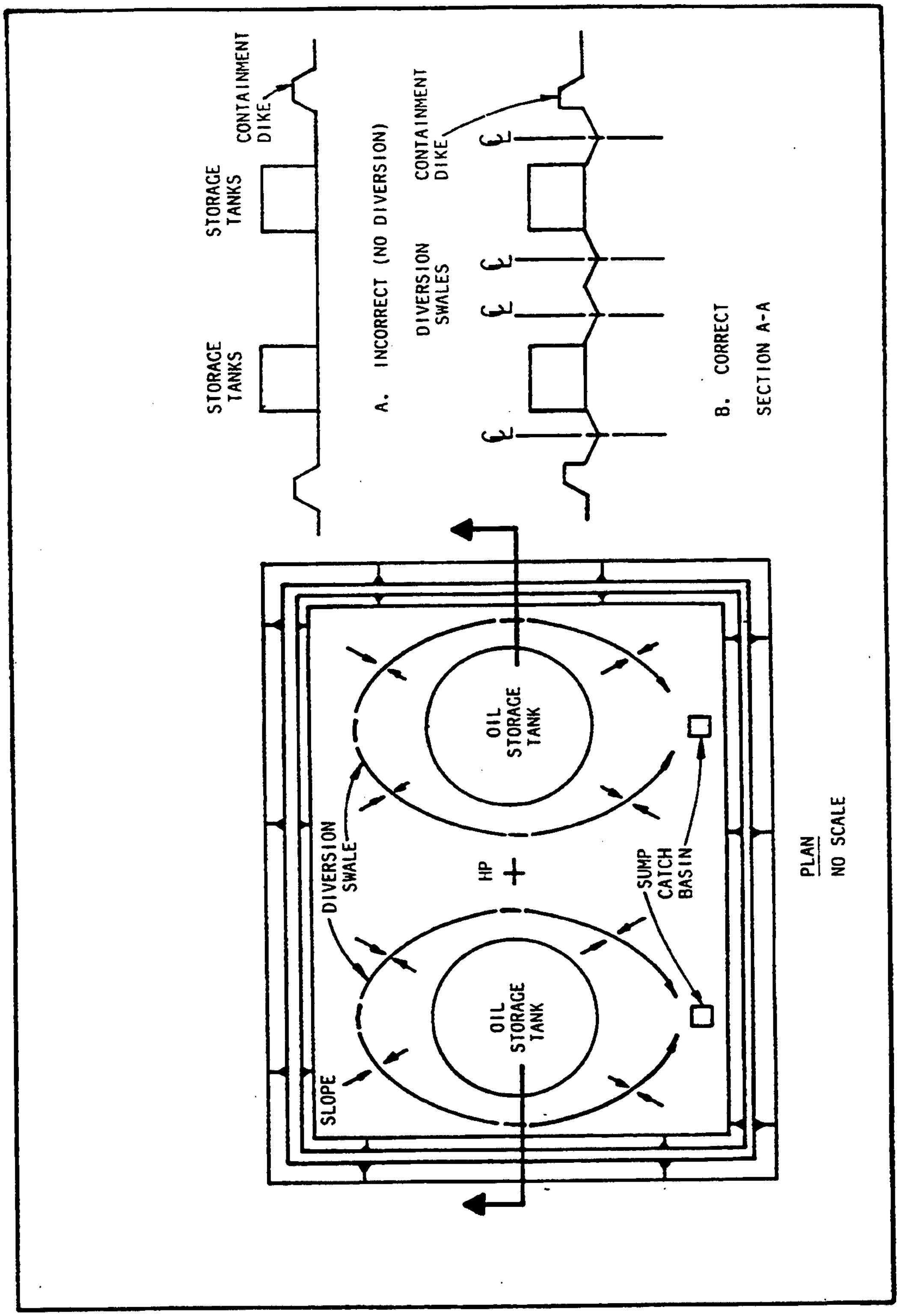


Figure 7-15
Typical Diversion Trench in Tank Containment Area

7.2.5 Sorbents and Drip Pans

112.7(c)(1)(vii)
112.7(c)(2)(i)

Sorbent materials, drip pans, and drainage mats are used to isolate and contain small drips or leaks until the source of the leak is repaired. Material handling equipment, such as valves and pumps, often have small leaks and are applications for using sorbents, drip pans, or drainage mats.

Although sorbents are usually used to control small isolated spills, they can also be used to contain and collect large-volume spills before they reach a watercourse. Sorbents include clay, vermiculite, diatomaceous earth, and man-made materials. Trade name sorbents composed of specially processed compounds are available; however, these specialty absorbents are generally for non-oil-related (hazardous material) spills or for collecting oil from water without sorbing the water. Sorbents are generally maintained in small quantities at HS handling or storage areas to clean up minor spills.

Since sorbents are usually used for minor cleanup, several 50-pound bags per area is generally adequate. Sorbent pads or socks, especially sorbents designed for oil/water mixtures, are ideal for removing small sheens of oil on stormwater before releasing. Each area must have a pre-planned location for storage and disposal of sorbents. Two large durable trashcans or drums usually suffice: one for storage and one for disposal.

Drip pans are widely used to contain small leaks from product dispensing containers (usually drums), uncoupling of hoses during bulk transfer operations, and for pumps, valves, and fittings. Drip pans are typically 5 to 15 gallons and may be plastic or metal, depending upon the type of chemical handled. They may be single pans for individual dispensing drums or gutter-type continuous pans built into multiple drum dispensing racks. Drip pans must be checked regularly and emptied when necessary so an overflow spill does not occur.

Drainage mats are sometimes used to prevent spilled product from entering into an uncontrolled drainage or sanitary sewer system. The mat is placed over a storm drain, sealing the drain against the entry of spilled material. Drainage mats are especially applicable in areas where constructing a secondary containment or diversion structure is impractical, such as a congested tanker truck unloading area. Drainage mats are typically made of synthetic rubber materials and can be stored on site or carried on a fuel delivery truck. The use of drainage mats is a low-cost solution to providing a degree of containment; however, it is not as fail-safe as the other containment techniques, since it is dependent upon the operator properly placing the mat.

Materials such as foams and gelling agents are commonly used at Navy activities to contain small spills in areas where physical secondary containment is not available. Foams that solidify to form a physical barrier or dike are highly effective forms of emergency secondary containment.

7.2.6 Weirs and Booms — 112.7(c)(1)(iv)

Weirs and booms are devices that take advantage of the fact that oil products are lighter than water and float on the surface. Booms are floating barriers that contain the oil that is floating on water. Weirs, on the other hand, do not contain oil but skim the oil off the surface of the water. Booms and weirs can be used on stormwater outfalls that flow into sensitive areas to contain oils which might accidentally have passed through other spill containment systems. The use of booms can be combined with floating sorbents or skimmers for collecting oil from bodies of water.

7.2.7 Spill Containment Alternatives — 112.7(d)

All applicable oil and hazardous waste areas are required to have spill containment structures. However, it may be impractical or impossible to build SPCC structures due to the physical surroundings; or it may be impractical, since the area is to be permanently closed in the near future. 40 CFR 112.7(d) requires that a strong contingency plan be prepared when constructing a spill containment structure is impractical. The contingency plan must meet the requirements of 40 CFR 109. In addition, a written commitment of manpower, equipment, and materials (booms, sorbents, shovels, etc.) must be made which details the control and removal of harmful quantities of spilled material.

7.3 UNDIKED AREA DRAINAGE

While all areas storing or handling oil or hazardous waste require some form of secondary containment, not all areas can be diked. Some areas may be more suited to stormwater controls to reduce the volume of runoff and concentration of contaminants in the runoff.

A system of trenches or drains, leading to retention ponds or a treatment system may be an adequate secondary containment system. The secondary containment system must retain the hazardous substance, return it to the area, or render it nonhazardous. If the treatment unit treats the material, it must be designed and permitted for the specific type of treatment. Drainage control and treatment is discussed further in Chapter 8 of this manual.

7.4 DESIGN CAPACITY

The most widely-accepted practice for sizing secondary containment is based on 40 CFR 112.7(e) which states that secondary containment should be sized to contain the volume of the largest single tank or container in the drainage area plus sufficient freeboard for precipitation. A recommended practice is to use 110% of the largest tank or container volume. Another practice is to use 100% of the largest tank or container plus a 24-hour, 10-year design storm. Using a 25-year design storm provides an extra margin of safety. However, final sizing for each particular application should be determined based on good engineering judgment.

A simple method for determining if an existing containment area has adequate capacity is shown in Figure 7-16. This example assumes a design storm of 6 inches and a 2-foot high containment curb. Note that the volume displaced by all storage tanks and structures within the containment area must be subtracted from its gross holding capacity. In addition, the required height of the berm must include the additional height required to contain the design storm. DM-22, Chapter 4, Section 5.0, requires a containment structure have a minimum of 1 foot of freeboard over the required capacity of the largest tank; this is to accommodate precipitation and is usually more than adequate. Other types of containment structures will use similar calculations but must take into account the site-specific factors, such as curb or berm height, storm volume, volume of storage tanks, and other factors not shown in this example.

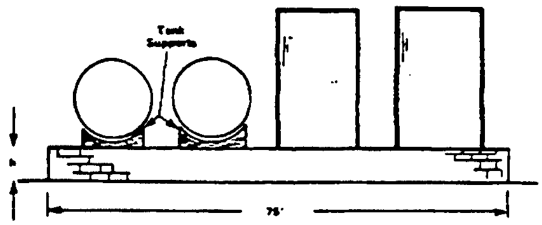
40 CFR 264.221(g) requires HW surface impoundments to have dikes designed to prevent overflow from overfilling, wind and wave action, rainfall, run-on, malfunctions of level controllers, alarms and other equipment, and human error. A surface impoundment should at least two (2) feet of freeboard. However, overflow can be prevented by controlling the filling rate of the impoundment and by providing a means of controlled releases during emergencies, such as overfilling due to rainfall. Also, run-on control should be provided using dikes or diversion channels.

Figure 7-17 shows an example of a surface impoundment containment and diversion structure. The outlet pipe extends through the bottom of the dike into a concrete-lined pump chamber (sump). A sluice gate controls the discharge from the pond to the sump. Pumps, controlled by level indicators and high-level alarms, discharge the wastewater to a treatment unit/plant.

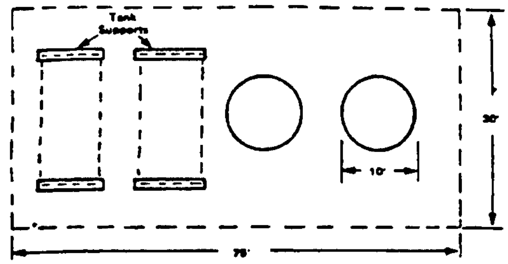
If the capacity of a containment area is insufficient, one or more of the spill containment systems discussed in Section 7.2 should be installed. Raising the dike or curb walls, installing a sump or catch basin, or diverting excess volume to a remote containment area are also ways of increasing containment capacity. The best alternative will depend upon space limitations, required volume, feasibility, and costs. In general, containment structures are simpler, more effective, easier to inspect and maintain, and less expensive to construct than diversion structures. However, diversion structures are sometimes the only alternative, particularly for older areas with severe space restrictions. Before diverting flow to a waste treatment area, certain considerations must be evaluated, such as material compatibility, loading capacity, and other factors that could impact on the operation of the area.

7.5 STRUCTURAL STRENGTH

Spill control structures should withstand the fluid loads placed upon them by a full-capacity spill and rainfall. A structural engineer should design these structures according to DM-22 and other appropriate design standards. Poorly designed, constructed, or maintained dikes, particularly concrete blocks, may result in a failure.



CONTAINMENT AREA ELEVATION



CONTAINMENT AREA PLAN VIEW

SOURCE: Ecology and Environment, Inc., 1983.

Computations:

- Measure height (h), length (L), and width (B) of containment structure. Design storm = 6 in.
- Calculate available surface area (A) (ft^2):

  $A = A_w - A_t$

  where A_W = Walled area

  A_t = Floor space inside walled area physically occupied by tanks, containers, and other structures

  $A = (75 \times 30) - 2(pi)(10/2)^2$

  $A = 2{,}093\ ft^2$
- Calculate available capacity (C) of dike (ft^3):

  $C = A \times h$

  $C = 2{,}093 \times 2 = 4{,}185\ ft^3$
- Check if available capacity is adequate to hold volume of largest tank/container (V_t):

  $V_t = 20{,}000$ gal. x .1337 ft^3/gal = 2,674 ft^3/gal = 2,674 ft^3 < 4,185 ft^3 OK
- Check if containment area allows sufficient freeboard (h_D) for precipitation:

  $h_D = [(C - V_t)/A] \times 12$

  $h_D = [(4{,}185 - 2{,}674)/2{,}093] \times 12 + 6 = 8.7$ in. > 6 in. OK

  Therefore, capacity of containment area is adequate.

Figure 7-16
Example Calculation of Secondary Containment Capacity

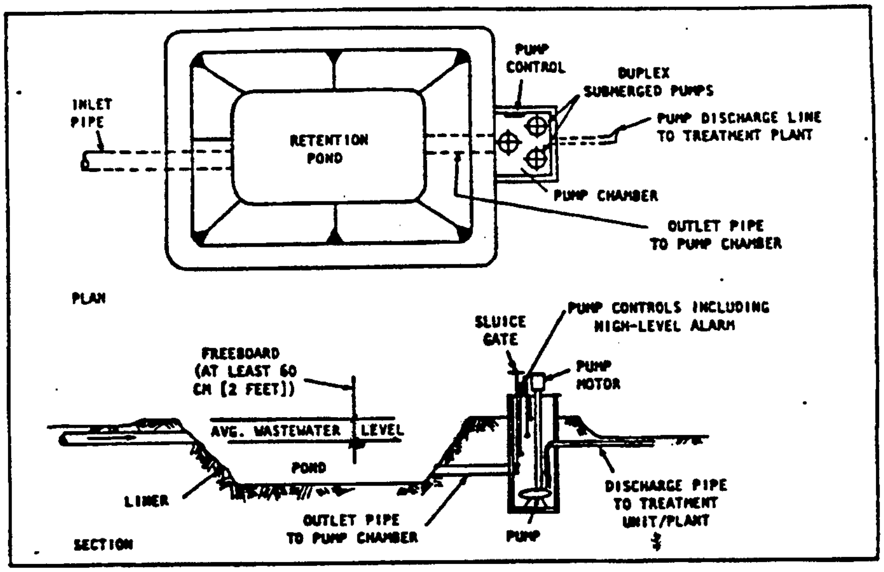


Figure 7-17
Retention Pond with Overflow Prevention And Control System

Fluid density is a major consideration in the selection of secondary containment systems. Since some chemicals have triple the density, or more, of water, secondary containment structures should not be used indiscriminately for substances with greater than design densities.

Surface impoundment dikes must be designed, constructed, and maintained with sufficient structural integrity to prevent massive failure of the dikes (40 CFR 264.221 (h)). Cracks in the structure indicate poor structural strength and integrity. A spill control structure with insufficient structural strength could result in a massive failure (i.e., dike washed away by spill). Such areas should be retrofitted (strengthened or relieved by spill diversion systems or catch basins) or replaced based on a specialist's recommendations.

7.6 IMPERMEABILITY

Both the dike and the bottom of secondary containment structures, retention ponds, and lagoons should be sufficiently impervious to contain and prevent seepage of the spillage until it can be removed or treated. Suitable liner materials include concrete, asphalt, synthetic membranes, reinforced air-blown cement mortar, clay soils, and specially treated bentonite/soil mixtures. The construction material must be suitable for the stored material (i.e. asphalt, will provide impermeable containment for heavier fuels, but not for lighter fuels such as jet fuels).

The Naval Facilities Engineering Command has a Design Manual entitled "Petroleum Fuel Facilities, Design Manual" which contains guidelines on the term impermeable from the BMP perspective as follows:

Earthen dikes shall be constructed of impervious clay or covered with a layer of such clay, concrete, or asphalt with rubberized coal tar sealer. The sides and top of the dike and the basin floor around the tank shall be covered with one of the following materials:

- 3 inches of impervious clay such as bentonite covered by 6 inches of sand and 8 inches of crushed stone.
- 3 inches of concrete paving or air-blown cement mortar reinforced with woven wire fabric. Expansion and contraction joints shall be provided as necessary. Joint material shall be impervious to the fuel.
- 2 inches of impervious asphalt with rubberized coal tar sealer over 4 inches of compacted base course.

It also states that the drainage system can serve more than one storage tank. The drains shall be constructed of petroleum resistant impervious material.

Legally the term impermeable refers to the containment of spills such that they do not reach navigable waters. The material that could potentially spill, needs to be evaluated in conjunction with the spill containment measures to see that a spill not reach navigable waters.

Poured reinforced concrete and asphalt are the most common materials used. Clays are commonly used to construct earthen dikes, due to their relatively impervious characteristics. The containment side of concrete blocks must be treated with sealers. Special epoxy coatings are sometimes used on floors, swales, and channels to provide chemical-resistant and impervious surfaces.

Per 40 CFR 264.221(a), hazardous waste surface impoundments require a liner. Single-liner systems are usually composed of clay or synthetic flexible membranes. However, clay performs poorly with highly acidic or alkaline wastes or wastes with high concentrations of dissolved salts. Table 7-2 presents a summary of flexible membrane liner and applications. Flexible membranes used in an application not shown in this table may leak.

Double-liner systems are generally preferred for hazardous waste surface impoundments. New surface impoundments must have two or more liners and a leachate collection system between such liners (40 CFR 264.221(c)). The leachate collection system may consist of a sand, gravel, and/or geotextile layer underlying the entire area to provide continuous coverage. A typical double-lined hazardous waste surface impoundment with a leachate collection system is illustrated in Figure 7-18.

7.7 COMPATIBILITY

Spill control structures and liners must be compatible with the contained material. Cost and durability are important factors in selecting the lining material. A qualified

engineer should evaluate the specific site conditions and construction/lining materials prior to construction.

Signs of erosion, deterioration, or liquid seepage through the control structure can indicate a compatibility problem. Incompatibility problems require prompt correction to prevent the deterioration of the control structure. Lining the surface with a resistant material such as an epoxy coat, tar, or other material is a relatively common and usually an inexpensive method.

7.8 INTEGRITY

Spill control structures should be structurally sound and free of cracks, holes, or other defects that could lead to a structural failure. Breached dike walls, cracked containment floors, unsealed penetrations, and damaged or nonexistent joint sealants are all indications of a breach in the structural integrity of a containment system. If a spill control structure is in poor condition and can not adequately contain a spill, the structure should be repaired or replaced immediately. Any materials used in repairs should be compatible with and resistant to any potentially spilled material.

Table 7-2
Comparison of Various Synthetic Polymeric Membranes

Liner Type	Advantages	Disadvantages	Relative Cost
Polyvinyl Chloride (PVC)	Good resistance to ozone and ultraviolet light when properly stabilized Good resistance to puncture, abrasion, and microbial activity High tensile strength	Poor resistance to hydrocarbons, solvents, and oils May deteriorate in presence of certain chemicals and in contact with heat	Low
Oil-Resistant PVC	Improved resistance to aromatic hydrocarbons relative to standard grades of PVC	Poor low temperature handling properties	Moderate to high
Polyethylene*	Excellent resistance to bacterial deterioration Good tensile strength Few restrictions on chemical exposure Good low-temperature characteristics	Poor puncture resistance Poor tear strength Susceptible to weathering and stress cracking	Low
Chlorinate Polyethylene (CPE)	Excellent weatherability Good tensile and elongation strength Good resistance to ultraviolet light and ozone Excellent crack and impact resistance at low temperatures Moderate to good hydrocarbon resistance Resistant to acids and bases	Limited range of tolerance for chemicals, oils, and solvents Low recovery when subject to tensile stress	Moderate
Butyl Rubber (continued)	High tolerance for temperature extremes Good tensile and shear strength Good resistance to puncture Ages well in general, but some compounds will crack on ozone exposure	Slightly affected by oxygenated solvents and other polar liquids Poor sealability and workability	
Neoprene	Excellent aging and weathering characteristics Overall good resistance to hydrocarbons, but shows some swell when exposed to aromatics and other cyclic hydrocarbons Flexible and elastic over a wide range of temperatures	Not heat- or solvent-sealable	High

Table 7-3 Cont.
Comparison of Various Synthetic Polymeric Membranes

Liner Type	Advantages	Disadvantages	Relative Cost
Elasticized Polyolefin (DuPont 3110)	Resistant to ultraviolet light; does not require earth cover Good resistance to weathering and aging Good resistance to ozone attack and soil microorganisms Good resistance to hydrocarbons: will accommodate a broad range of solvents	Relatively untested Vulnerable at low temperatures	Moderate
Chlorosulfonated Polyethylene (CSPC or Hypalon)	Good puncture resistance Good resistance to microbial attack Excellent resistance to low temperature cracking Excellent weather resistance Good resistance to ozone and ultraviolet light Flexible and resilient	Low tensile strength Poor resistance to aromatic hydrocarbons	
Ethylene Propylene Diene Monomer (EPDM)	Good weathering characteristics Good temperature flexibility Good heat and ultraviolet light resistance Resistant to mildew, mold, and fungus Excellent resistance to water vapor transmission	Low peel and shear strength Not recommended for petroleum, aromatic, or halogenated solvents Resistant only to dilute acids and alkalis	
Butyl Rubber	Excellent resistance to water Excellent resistance to ultraviolet light and ozone	Poor resistance to hydrocarbons, particularly petroleum solvents, aromatics, and halogenated solvents	Moderate to high
Epichlorohydrin Rubbers	Resistant to hydrocarbon solvents, fuels, and oils Resistant to ozone and weathering High tolerance for temperature extremes Good tensile and tear strength	Permeable to gas and water vapor	Moderate

* Refers to low-density polyethylene. High-density polyethylene is much less susceptible to puncture, tear, weathering, and stress cracking.

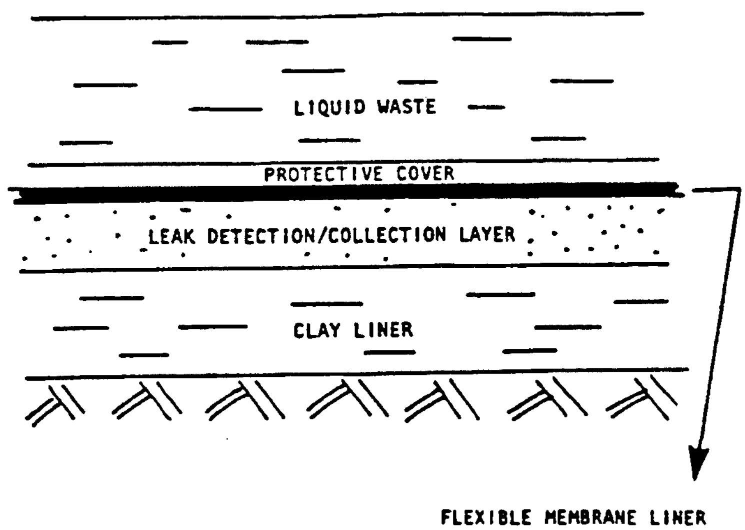


Figure 7-18
Cross Section Of Lined Industrial Waste Impoundment

The integrity of a bulk storage tank's spill containment system includes not only the dike and the floor of the containment area, but also the tank foundation. The bottom of bulk fuel storage tanks can develop leaks that undermine the surrounding soil. To prevent this, DM-22 requires that bulk tanks rest on a reinforced concrete ringwall with compacted fill material inside the ringwall. DM-22 also requires an oil-resistant plastic membrane be installed between the fill and the ringwall. This membrane provides an impervious layer between the tank and the groundwater. A drainpipe installed under the tank through the concrete ring wall drains any water collected between the tank and the membrane. Drainage through this pipe can be an indicator of tank bottom leaks. The only other method to detect and remedy a bulk tank bottom leak is to inspect the inside of the tank regularly; repairs must be done from the inside.

Where transfer and drainage pipelines pierce a spill control structure, they should be grouted to provide a fluid-tight seal.

7.9 FLOODING PROVISIONS

Considerations should be made for flooding potential when designing secondary containment, drainage systems, or treatment units. Retention ponds, basins, and mobile tanks and their associated secondary containment should not be located in flood plans or areas subject to flooding. Information regarding flood plains is available from the U.S. Geological Survey, the Corps of Engineers, or local government agencies.

HW areas regulated by 40 CFR 264 or 265 and located in a 100-year flood plain must be designed to prevent washout of any HW. An exception can be made if the waste can be removed before floodwaters can reach the area.

CHAPTER 8

DRAINAGE CONTROL AND TREATMENT UNITS

8.1 INTRODUCTION

Area related guidance is a general SPCC guidance that addresses multiple regulations, not just 40 CFR 112. The Clean Water Act (CWA) Section 311(b)(1) prohibits discharges of oil or hazardous substances (HS) into or upon the navigable waters of the United States, or adjoining shorelines. Drainage controls not only prevent spills from reaching navigable waterways, but they also prevent clean stormwater from entering contaminated areas.

Drainage control is the collection, transfer, treatment, and release of spills and precipitation. During normal area operations, oil and HS areas will have small spills. If the spills are not cleaned up promptly and properly, the spilled material will commingle with precipitation and possibly contaminate the area run-off. Since not all spills will be cleaned up properly and promptly, area stormwater must be contained and/or treated to prevent contaminated precipitation from reaching navigable waterways.

Drainage control structures and equipment include stormwater collection systems (ditches, trench drains, culverts, etc.), pumps, siphons, valves, oil-water separators, and treatment systems. In its simplest form, drainage control requires maintaining a supply of sorbents to be used to remove an oil film before unlocking and opening a drain valve to release the stormwater from a diked area. Drainage control in its most advanced form is an in-plant treatment unit designed to treat both routine and large spills. Whether an oil or chemical area needs a simple or elaborate system is dependent upon the potential for and history of spills at the area. Whatever methods are used, the drainage control system should prevent a spill from reaching navigable waters in the event of equipment failure or human error at the area.

NO TREATMENT DEVICE SHOULD BE INSTALLED THAT DISCHARGES TO THE STORM DRAINAGE SYSTEM / THE ENVIRONMENT WITHOUT CHECKING WITH THE APPROPRIATE NPDES / STATE PERMITTING AUTHORITY.

Drainage control requirements addressed in this chapter include:

- Collection and containment
- Transfer
- Treatment units
- Flow between treatment units

- Bypassing treatment units

8.2 COLLECTION AND CONTAINMENT

112.7(e)(1)(iii)
112.7(e)(1)(iv)

Oil and HS storage, transfer, and process areas routinely experience small operational spills that can contaminate stormwater; every oil and HS area has the potential to contaminate stormwater. To determine if the existing collection systems for an area needs to be upgraded, site topography, drainage patterns, and control systems should be examined. Chapter 7 addresses containment and diversion structures.

A properly designed stormwater collection system segregates "clean" and "dirty" runoff. Stormwater that is diverted around or away from storage areas should remain clean and should not require any treatment or pose any risk of being contaminated. Contaminated stormwater should be directed to ponds, lagoons, catchment basins, or treatment units designed to retain or treat the stormwater prior to discharge into receiving waters. Segregation between the clean and dirty areas is generally accomplished by pavement grading and installation of diversion structures such as curbs, gutters, walls, and other physical barriers, as discussed in Chapter 7. Figure 8-1 illustrates the segregation of area drainage. Figure 8-1 (A) shows a containment area without proper means to segregate clean and dirty stormwater. In Figure 8-1 (B), a diversion swale upgradient of the containment area diverts clean stormwater away from the site. Another example of a drainage segregation design is to install a roof over an outdoor product dispensing area; all of the stormwater landing on roof will be clean and does not require treatment.

Loading/unloading racks, fill ports, and pumps, are areas that often experience small, undetected leaks and spills. These areas should be identified as "dirty," since they can contaminate stormwater. Roofs, personal vehicle parking lots, grassy areas, and other such areas that are not likely to be contaminated by oil or HS during area operations should be identified as "clean." Though these areas may not be clean in an actual sense (for example, if there are oil leaks in a parking area), these areas are not an operational part of the storage or handling area.

Only uncontaminated stormwater should be released from diked or other drainage areas, unless it is released to a treatment unit capable of processing the volume and type of contamination. Drainage should be controlled by drainage valves, stand pipes, manually operated pumps or ejectors, or other active means. Manual open-and-close valves are preferred, since they minimize the chance of releasing contaminated stormwater. Automated valves may accidentally be opened without the judgment of a person actually at the site and viewing the site conditions. Figure 8-2 shows two methods for securing the drainage control valve. A gate valve (post-indicator type) is preferred because it provides a visual indication of the status of the valve. Flapper type valves, which may be spring loaded, do not stay reliably shut and, per 40 CFR 112.7(e)(1)(ii), should not be used.

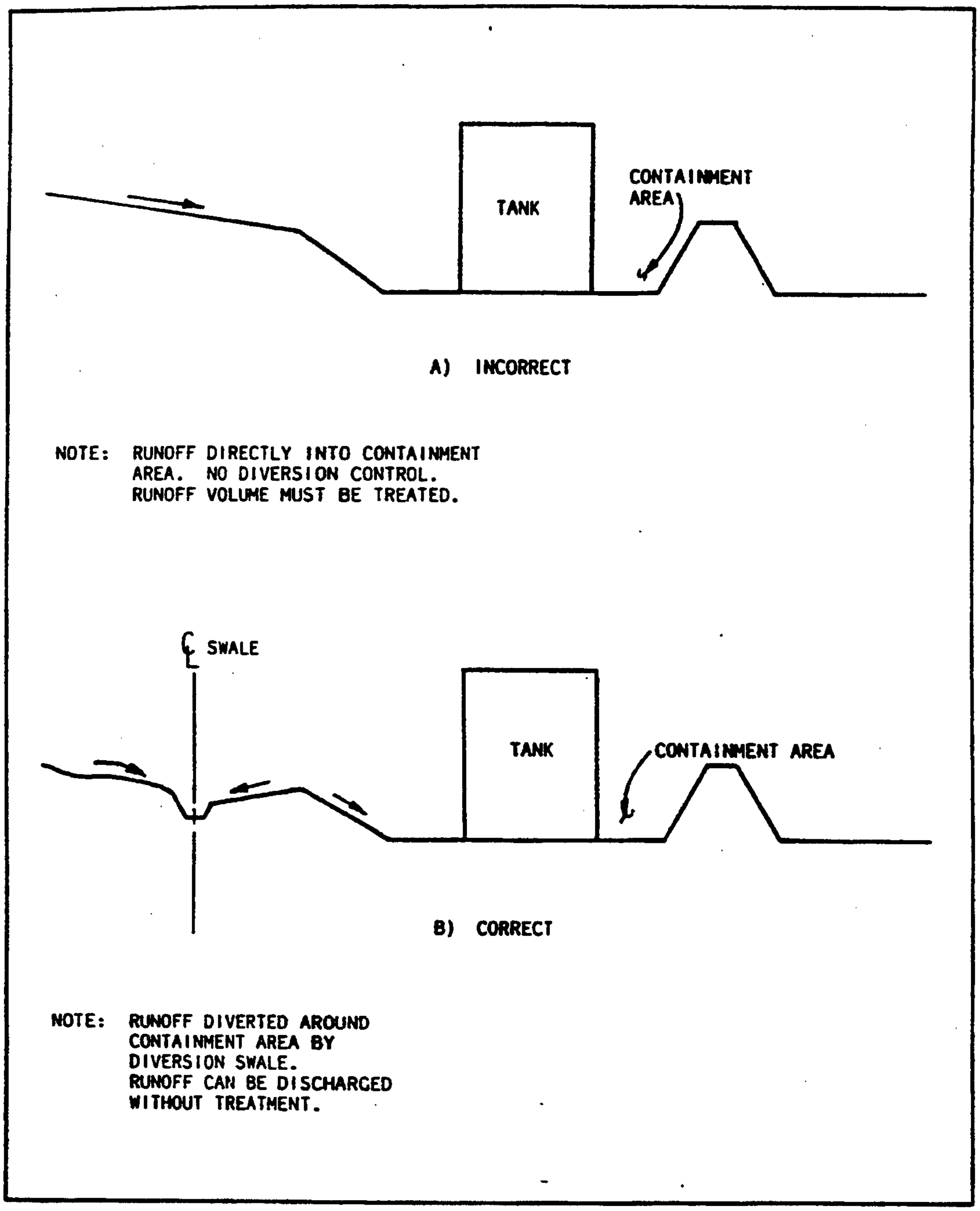


Figure 8-1
Use of Diversion Structure To Control Storm Runoff

Lack of valves on drainage pipes, valves inadvertently left open or sabotaged, and valves that do not provide adequate protection are the most prevalent ways of violating the integrity of a containment system. The best way to avoid accidental releases is to eliminate all drains from the area. While this can be perceived as an extreme measure,

it may be preferable to testing the stormwater for pollutants and pumping the contaminated water into tanker trucks.

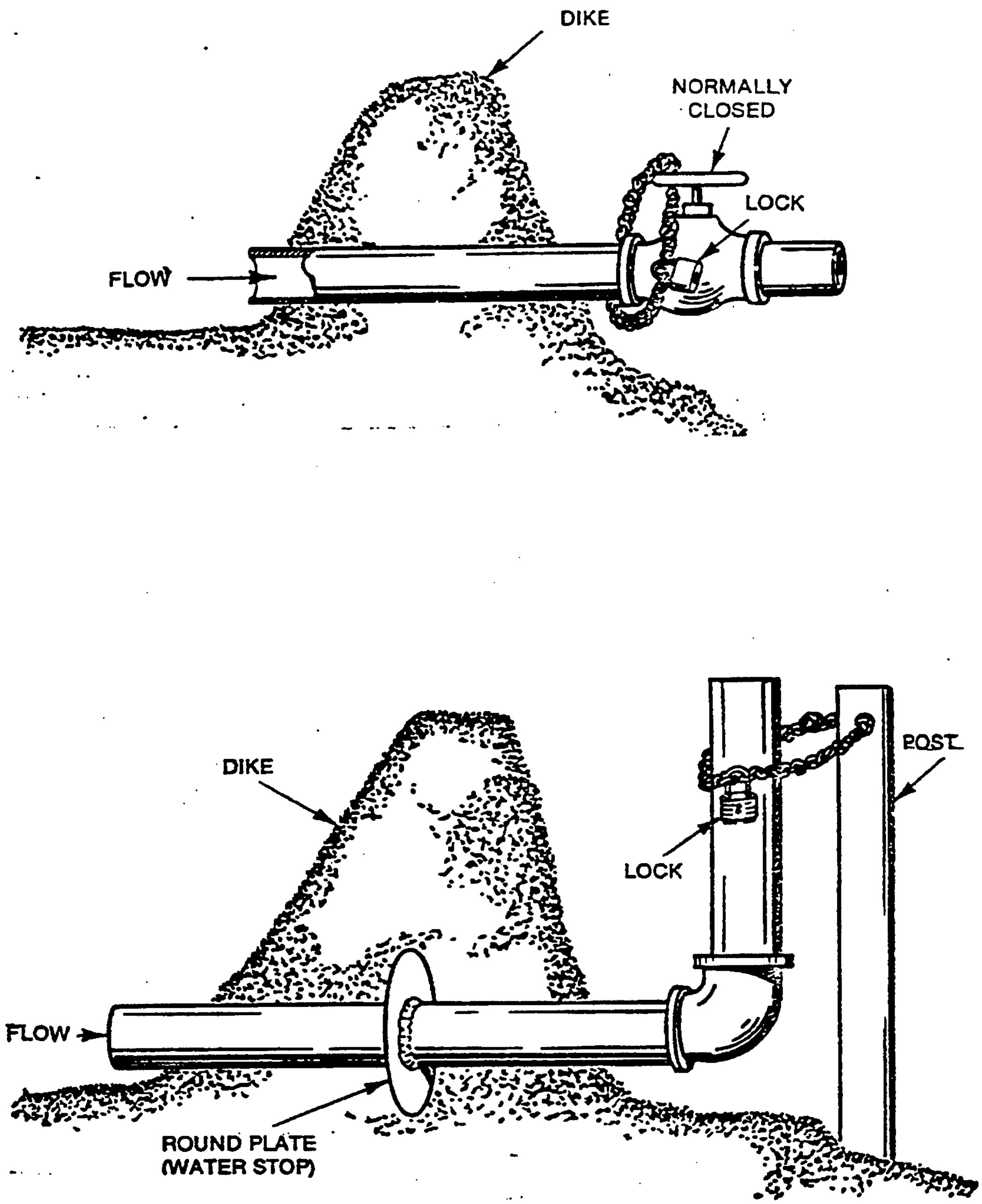


Figure 8-2
Examples of Locking Drainage Valves

Most facilities maintain rigid control over the drain valves in containment areas by keeping valves in the locked-closed position. Prior to draining, the water quality must be assessed to determine if it is in compliance with applicable water quality standards. Once the area is drained, the valve should be locked and the date recorded in a log for legal protection. Discharging the drainage into an oil-water separator (i.e., for lighter than water insoluble products) or draining the water through a bed or filter of sorbent material can remove any residual contaminants. Manufacturers can recommend sorbent materials that are effective in removing specific contaminants.

Not all drainage pipes are valved, and depending on the volume of oil or HS stored this situation may be a serious deficiency, which must be corrected immediately to prevent a significant contamination or spill problem.

8.3 TRANSFER — 112.7(e)(1)

Once the stormwater is collected and contained, it must be disposed. Spills should be collected and transferred using the best technology available for the material spilled; each spill should be evaluated individually. It is recommended that secondary containment drainage be appropriately documented/logged. The following are management methods for transferring the stormwater from the storage area to the treatment system.

- The stormwater is retained until it is released directly to a waterway (if "clean") or a treatment unit (if "dirty").
- The stormwater is retained until any contamination or sheen is removed from the water using a sorbent material or other method.
- The stormwater is retained in the containment area until it evaporates. This is useful only when the containment design and average annual rainfall quantities allow use of such a method. It is important that the stormwater does not leave the containment area through percolation into the ground (which is a deficiency in the spill control structure).
- The stormwater is not retained, but flows to a treatment unit that is sized to retain and treat the stormwater and spill volumes.

After inspecting the stormwater for contamination or sheen, the containment area should be drained, preferably by gravity (see Figure 8-3), or pumped to a treatment system or retention pond. Whenever possible, gravity flow should be used to transfer stormwater contaminated with oil to treatment units. This prevents the emulsification of the oil which inhibits the oil removal. One method is to open a manual, open-and-close valve. Manually-activated pumps and ejectors may also remove collected run-off from a containment area; however, the accumulated liquid must be monitored for contamination or a sheen. The exception to this monitoring requirement is when the containment drains directly to a treatment unit.

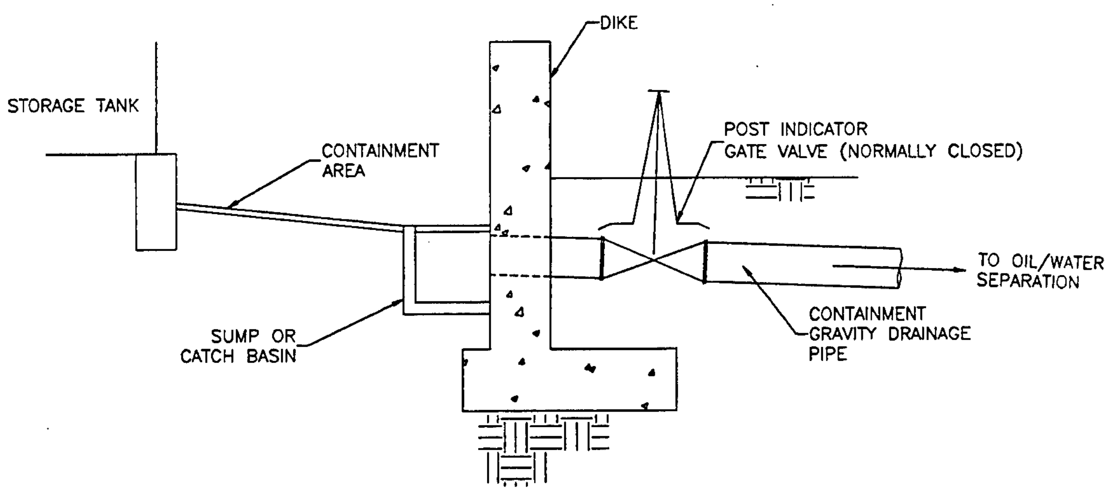


Figure 8-3
Gravity Drainage From Containment Area

A siphon system, as shown in Figure 8-4, is the preferred method of stormwater transfer. This system prevents accidental discharge through a valve that may inadvertently be left open. In addition, with a siphon, no piping goes through the dike, eliminating a potential seepage route.

8.4 TREATMENT UNITS

A variety of wastes can be generated at an oil and HS areas such as free oils and HS liquids (floating and dispersed droplets), emulsified oils and HS liquids (physical and chemical), dissolved oils and HS, oil and HS adsorbed on particulate matter, oily sludges, and HS solids. These wastes can be generated from maintenance shops, aircraft service aprons, POL areas, tank farms, other oil-related operations, HS storage areas, HW storage areas, and industrial shops. This section provides general guidance on treatment units, detailed guidance can be found in MIL-HDBK-1005/9 (Military Handbook Industrial and Oily Wastewater Control).

The type and flow of drainage from diked and other spill-prone areas into a treatment system should be controlled so that the system can handle the discharge without being damaged. Treatment systems typically require a unit designed for the specific requirements of the type and quantity of waste. The types of waste present and the capability of the treatment unit to handle the different types of waste should be considered when evaluating the area's drainage control. Before discharging any effluent, the National Pollutant Discharge Elimination System (NPDES) permit must be checked to verify any restrictions.

A review of available treatment methods for HS is beyond the scope of this manual; however, MIL-HDBK-1005/9 (Military Handbook Industrial and Oily Wastewater Control)

provides general guidance, design data, and information related to industrial and oily wastewater control.

8.4.1 Oil-Water Separators

Oil-water separators operate on a gravity separation principle: most oils are lighter than water and rise to the top of a water column. However, some synthetic oils, e.g. transformer oil, may be denser than water and may be retained by an oil-water separator.

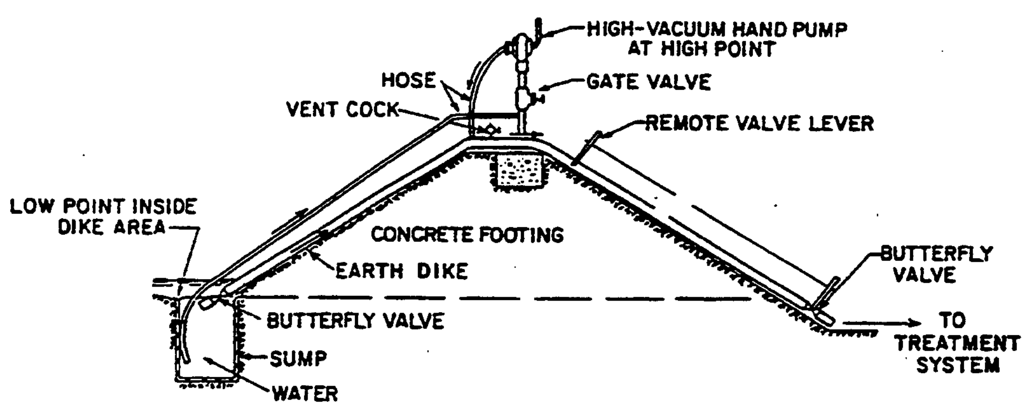


Figure 8-4
Dike Drainage Transfer System Using Siphon

Figure 8-5 presents a simplified schematic of two types of oil-water separators both operating on the same principle: oily water enters the separator and is retained; oil droplets rise to the surface and form an oily layer; the layer is removed, and clean water is withdrawn from near the bottom of the tank by gravity flow or by pumping.

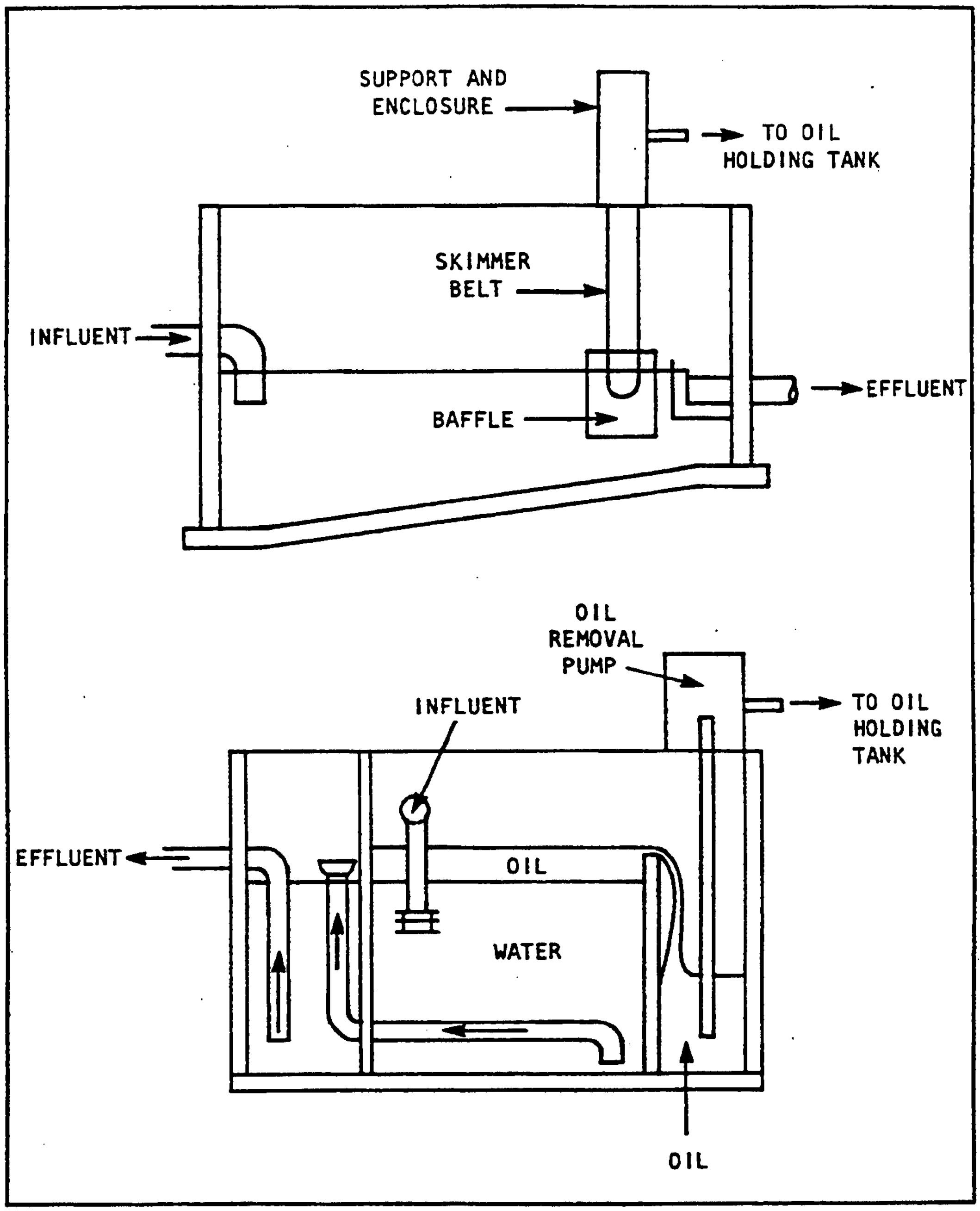


Figure 8-5
Two Typical Oil-Water Separator Configurations

Most of the oil present in oily effluents can be separated by gravity and skimmed, provided that it is not emulsified or too finely divided. To avoid the formation of such finely divided droplets, it is important to avoid pumping oily streams before they have passed through the main gravity separation, especially if there is detergent present. Detergent may prevent an oil-water separator from working properly.

Oil-water separators fail due to poor maintenance, improper installation, undersizing, selection of the wrong separator type, and too much detergent in the water. Problems arise with oil-water separators when accumulated oil is not periodically removed. Oil builds up and displaces water in the tank resulting in reduced retention time and a decrease in efficiency. Ultimately, if the oil build-up becomes severe, oil will fill the entire unit and discharge through the outlet pipe. If the oil build-up must be removed daily or weekly, then the unit may be undersized and should be replaced by a properly sized unit. The API publication, "Manual on Disposal of Refinery Wastes," provides information on sizing and proportioning oil-water separators.

Run-off from parking lots, runways, roads, taxiways, and grassy areas can be routed through small oil-water separators to remove small volumes of oil. Drainage from aircraft and vehicle wash racks, maintenance areas and POL areas is generally more polluted and should be directed through larger capacity oil-water separators, skimming dams, or drainage interceptors.

Oily effluents are almost invariably passed first through a gravity separator such as a simple rectangular basin, preferably of American Petroleum Institute (API) design, or a circular clarifier or a plate separator. Oily effluents should flow by gravity to the gravity separator. These separators are usually at the lowest elevation of the site, recessed in the ground, or both.

An oil treatment unit should remove any oily sheen from the surface of the water. A visible sheen on water is generally at least 10 to 15 ppm of oil. Often the simplest way to evaluate the effectiveness of an oil treatment unit is to observe drainage operations and monitor for sheen.

8.4.2 API Separator

The principle of the API separator is to slow the oily water entering the inlet bay and to allow it to pass slowly, smoothly, and undisturbed along the length of the main bays (at least two similar parallel bays). API separators operate on the principle of Stokes Law. Stokes Law states that the velocity in which an oil droplet rises is proportional to the difference in the specific gravity of the oil and the water. API separators provide ample detention time to allow droplets of oil to rise to the surface, coalesce, and are skimmed to a recovery chamber. Figure 8-6 shows a schematic of an API separator.

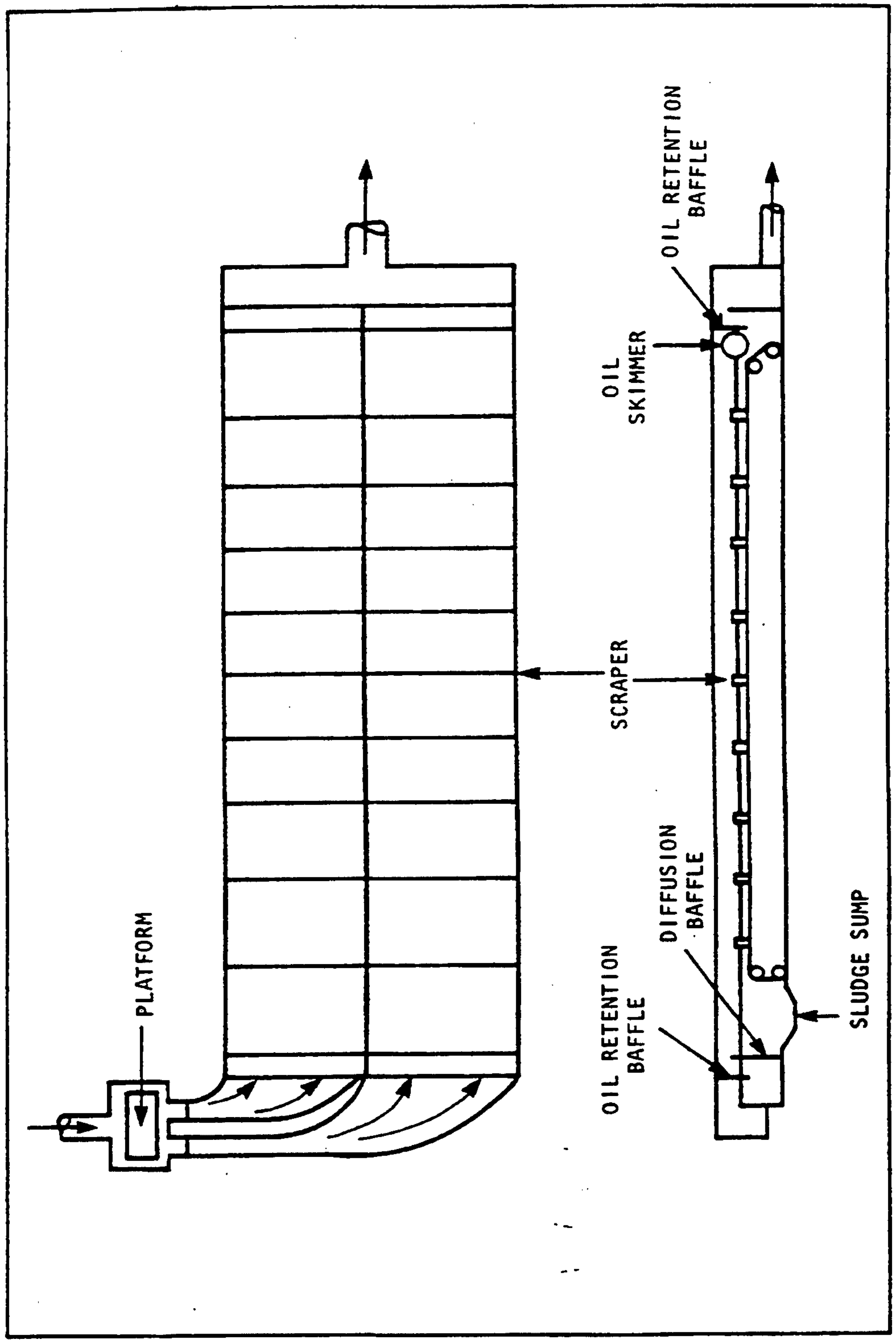


Figure 8-6
Schematic of API Separator

The efficiency of the separator depends upon how effectively the incoming water is slowed before it enters the main bays. It is important to avoid turbulence, since mixing the oil and water defeats the purpose of the separator. Separating the inlet bay from the main bays with vertical concrete pillars does remove the turbulence of the incoming water. Since much of the oil in the incoming oily water will be in the form of large globules that separate very easily, a considerable amount of the oil separates in the inlet bay and is skimmed. The medium-sized globules rise to the surface in the main bays and are also skimmed. The water containing the smallest oil globules, emulsified oil, soluble materials, and suspended matter with an effective density close to that of water passes through the main bays. The water then flows through a series of weirs into the outfall bay, from which it can flow by gravity or be pumped to the next treatment stage.

Oil is typically skimmed from the surface using a slotted pipe skimmer, a rotating disc skimmer, a belt skimmer, or a rope skimmer. The slotted pipe method skims a large quantity of water with the oil, which is then allowed to separate in an oil sump. The water is pumped back to the inlet of the API separator, and the oil layer is pumped to a recovered oil tank. With the rotating disc type of skimmer, a number of discs on an axle rotate and dip through the oil, picking up the oil. The oil is scraped into pouches that drain the oil away to a recovery tank. The belt and rope skimmers use either a belt or plastic tube that rotate and dip through the water. The oil attaches to the belt or the rope and is then scraped off. The rotating disc, belt, and rope skimmers have the advantage that they recover oil with very little water and can be left running; the slotted pipe skimmer requires intermittent manual operation and can remove a large quantity of water with the oil. Debris floating on the surface of the bays hinders the skimming process no matter which oil removal method is used.

Solids either settle at the bottom of the separator or are carried through the separator with the water, depending on their settling rate and density.

API separators are large by necessity, but they have a number of important advantages. They accept widely varying proportions and varieties of oil and solids, including viscous, sticky, or waxy oil. They also can retain very large quantities of oil after major accidents.

8.4.3 Plate Separator

A plate separator is, in effect, a large number of shallow separators stacked on top of each other and operating in parallel. The plate packs are spaced up to 4-inches apart. The oil droplets only have to rise this short distance before reaching the oil-wet surface above. Upon contact with the oil-wet surface, the oil coalesces into larger droplets. The plates are sloped and perforated so that the oil rises to the top of the pack and sludge settles downward. To avoid corrosion problems, the plates are usually plastic. The separated oil accumulates in a layer at the top of the plates and is pumped to a recovery tank. Figure 8-7 shows a schematic of a plate separator.

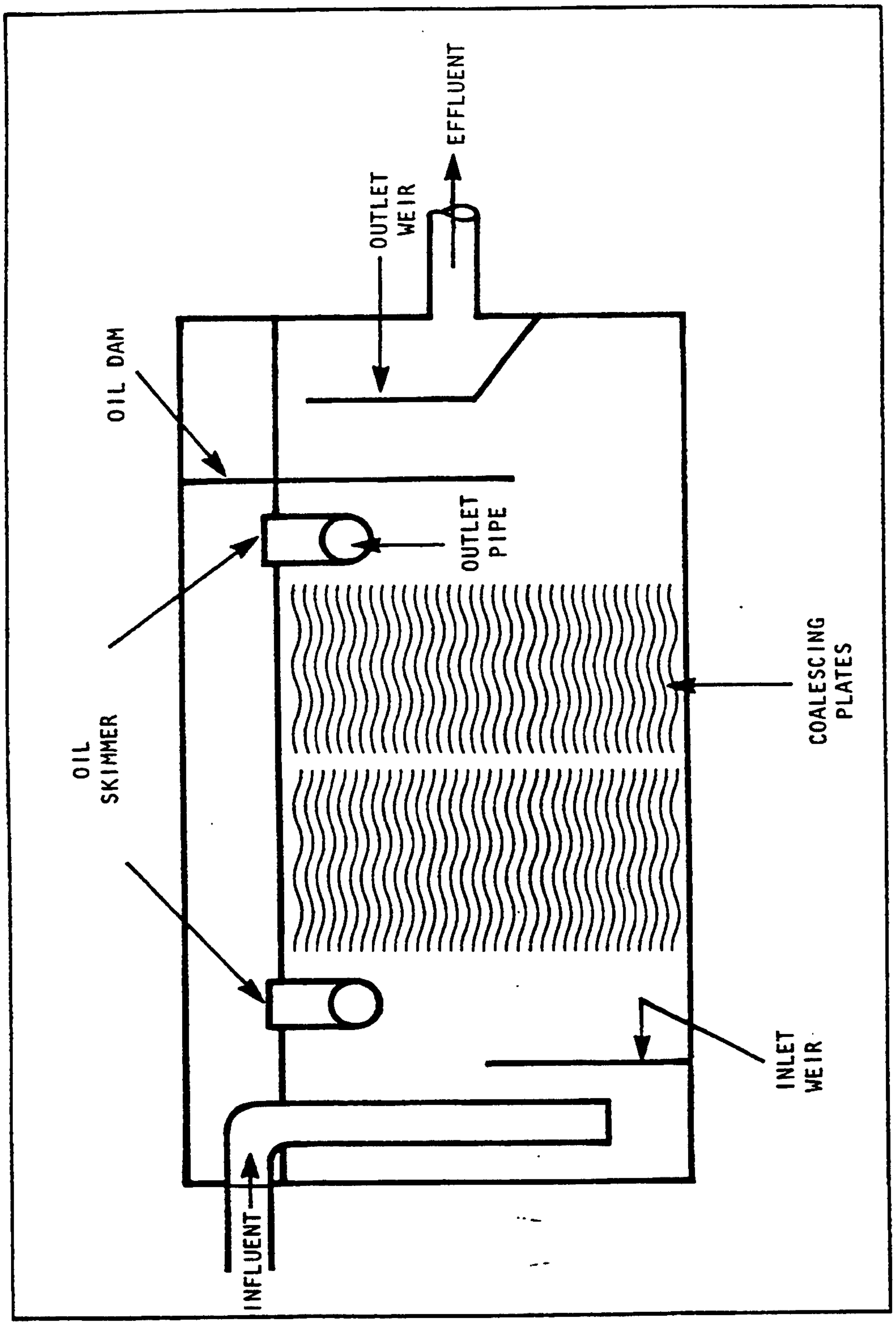


Figure 8-7
Schematic of Plate Separator

An advantage to plate separators is that they have no moving parts, are relatively compact, and can separate oil droplets down to a diameter of 60 microns (0.06 mm). Additionally, the separator can be enclosed and operated full of liquid to prevent vapor loss, and they can be enclosed in a pressure vessel.

The disadvantages to using plate separators are that they have very little capacity for retaining large "slugs" of oil following accidents, and they need frequent cleaning. Plate separators are easily blocked by viscous or waxy oil and thick sludge, and the large plate surface area has a strong tendency to grow bacterial films that are difficult to remove. Provisions for cleaning should be included when the plate separator is installed. Different plate shapes, the direction of slope, and attachments to the separator can facilitate removal of oil from the plates. A level controller and a pumping system to automatically begin oil removal when the oil level reaches a certain height is another method to assist in cleaning the separator.

8.4.4 Three-Chamber Gasoline Interceptor

A three-chamber gasoline interceptor is a simple structure made of brick or concrete and consists of three small chambers in series, as depicted in Figure 8-8. The three-chamber gasoline interceptor is designed for trapping spills of gasoline, jet fuel, or similar easily separable light liquids from small water flows. The water enters the first chamber through a pipe and flows through the other chambers via pipes coming from the lower region of each previous chamber. A visual inspection of the volume of gasoline or other material in the last chamber indicates when the interceptor needs cleaning.

8.4.5 Other Treatment Units

Spilled products and contaminated water are treated in a variety of unit processes depending on the nature (petroleum-based, acids, bases, solvents, metal solutions, etc.) and concentration (pure product or spill residual) of the oil and HS involved. Chemical, physical, thermal, and biological treatment processes such as pH neutralization, precipitation, distillation, filtration, or activated sludge processes are used routinely at Navy facilities. However, materials routinely spilled should be considered when designing treatment areas.

8.5 FLOW BETWEEN TREATMENT UNITS

If treatment units are installed in series, flow between the units should use gravity flow. If a pump is required, positive displacement pumps are preferred over centrifugal pumps. The positive displacement pumps do not shear the entrained oil that can result in emulsification as centrifugal pumps do.

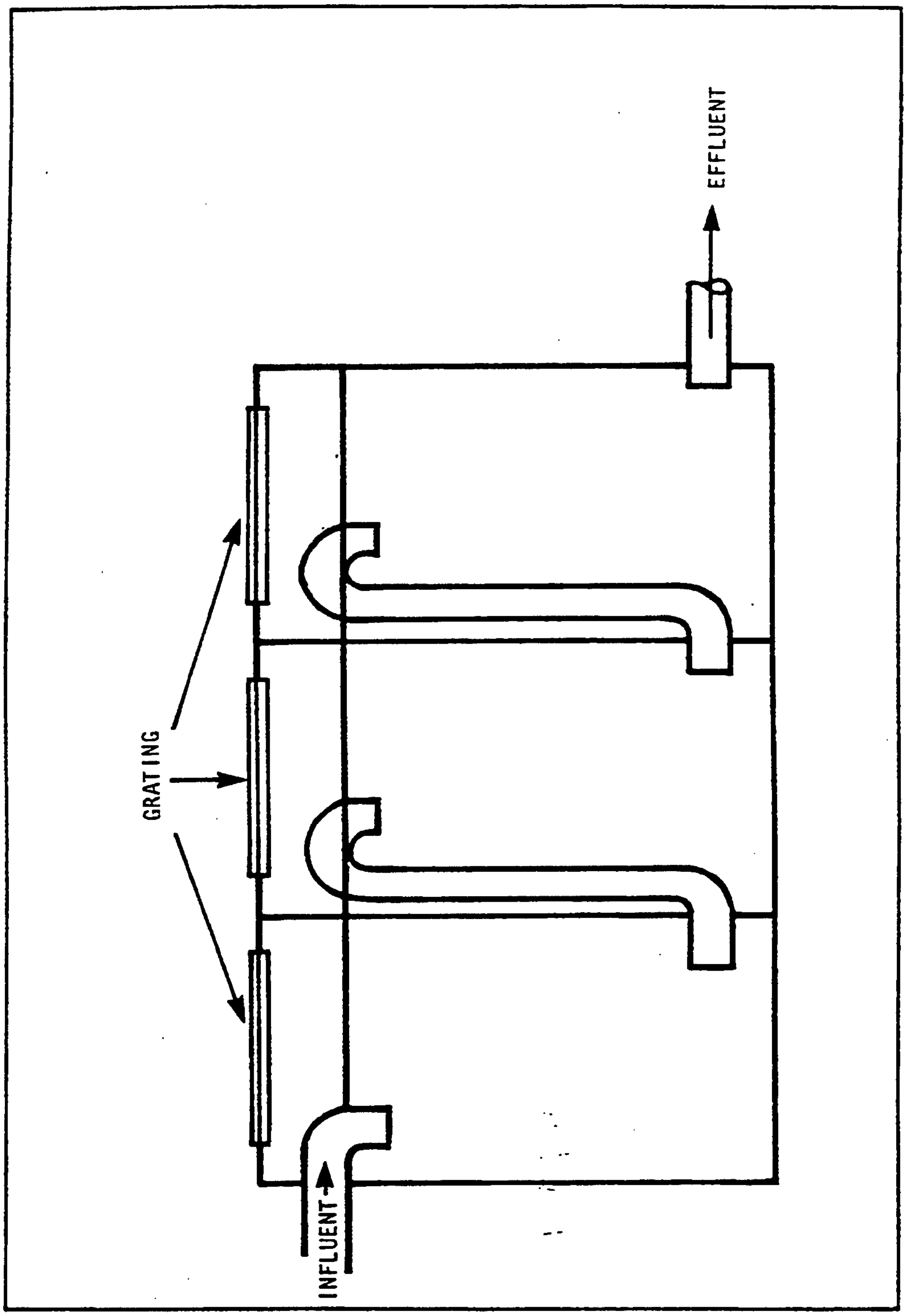


Figure 8-8
Schematic of Three-Chamber Gasoline Interceptor

If a pump is used to transfer drainage between the treatment units, two pumps should be available. If treatment is continuous, then at least one pump should be permanently installed. A portable pump will suffice as the second (backup) pump if maintenance personnel can respond quickly to install the pump in the event of failure of the primary pump. However, two permanently installed pumps are preferred for reliability.

8.6 BYPASSING TREATMENT UNITS

112.7(e)(1)(ii)
112.7(e)(2)(iii)

Treating discharge from containment areas and area drainage systems is not always required or desirable, since treating uncontaminated water adds to the cost of operating and maintaining an area. Bypassing a treatment area is generally accomplished by opening control valves. For example, the valve from the diked area to the treatment area would normally be open, and the valve on the piping bypassing the treatment area would be closed and locked. To by-pass the treatment system, the valve leading to the treatment system is closed and the bypass valve is opened.

Per 40 CFR 112.7(e)(2)(iii), bypassing treatment is only allowable if the following conditions are met:

a) The bypass valve is normally closed and locked.

b) Stormwater or discharge is inspected or tested for the presence of pollutants, and oil sheen is not present.

c) The bypass valve is opened, and then resealed and locked following drainage under responsible supervision.

d) Adequate records are kept.

CHAPTER 9

SECURITY

9.1. INTRODUCTION

Security is an important aspect of SPCC planning. Oil and HS spills can occur as a result of vandalism or pilferage of fuel or chemicals. The degree of security provisions necessary is dependent on the location, strategic importance, and potential for vandalism of the area. Regardless of the size or location of the area, some security is required.

All Navy bases are fenced and guarded against unauthorized entry. This in itself affords a great deal of protection against vandalism and sabotage. However, unauthorized personnel have been able to enter and use areas in the past (i.e. unauthorized loading of HW tank, pilferage of chemicals, tampering with valves, and pumps). Adequate security reduces the likelihood of spill incidents due to tampering, vandalism, and sabotage.

Area related guidance is a general SPCC guidance which addresses multiple regulations, not just 40 CFR 112. RCRA (40 CFR 264.14) requires the installation of security measures at HW handling sites, and SPCC regulations (40 CFR 112.7(e)(9)) recommend their implementation at oil handling sites to prevent accidental or intentional entry. Protection measures against vandalism, theft, sabotage or other improper and illegal use of the areas should be provided. These measures include fencing, lighting, vehicular traffic control, securing of equipment and buildings, including locks for valves, pumps, control switches, and gates, guards, and routine security patrols.

High-level security may be required at a major fuel or chemical area and may include barbwire fencing, security patrols, and centralized transfer controls and signals. A small aboveground storage tank may require low-level security consisting of simply having the valves locked shut.

9.2. FENCING **112.7(e)(9)(i)**

Security fencing prevents unauthorized access to petroleum or chemical storage or handling areas. 40 CFR 112(e)(9)(i) recommends that all oil handling, processing, and storing areas be fully fenced and entrance gates be locked and/or guarded when the plant is not operational or is unattended. Perimeter fencing is often adequate to satisfy the fencing requirement. However, there has still been unauthorized use of fuel pumps

by military and non-military personnel, resulting in valves being left open and fuel being spilled.

Sensitive storage and handling areas should be fenced separately within the larger fenced confines of the activity. Tanks, drums, loading/unloading areas, valves, pumps and other sensitive equipment, should be enclosed within the fenced area. In general, if fencing small remote areas is not practical; then valve locking becomes especially critical (See Section 9.4).

The minimum fence height recommended by DM-22 is seven feet above ground, surmounted by barbed wire, especially in high-risk areas. Installing up to three strands of barbed wire above the fixed fence structure is standard practice. While it has been proven that this system can be easily surmounted by an individual having specific intent to enter, it is sufficient for most applications. The law recognizes that it may be impossible to stop a determined and well-equipped vandal and requires only that a reasonable effort be made to discourage unauthorized entry.

At unusually sensitive or vandalism-prone fuel areas, continuous curbing should be constructed to discourage tunneling. The curbing should be a minimum of 6 inches below grade and 1 to 2 inches above grade.

If new fencing is needed, it should be designed and constructed in accordance with DM-22, DM-5.12, MIL-HDBK-1013/10, and MIL-HDBK-1013/1A.

9.3. GATES

Gates in fences are designed using the same design manuals as fences, as specified in DM-22, DM-5.12, MIL-HDBK-1013/10, and MIL-HDBK-1013/1A. Any gates should be securely locked or guarded when the area is unattended or not in operation.

9.4. EQUIPMENT AND BUILDING SECURITY 112.7(e)(9)

All buildings, areas, and equipment susceptible to vandalism or unauthorized use, should be provided with appropriate locks to prevent actions which could result in releases. This equipment includes valves, pumps, controls, and connections. At a minimum, the following security requirements should be practiced for areas and equipment at Navy activities. While the 40 CFR 112 requirements only apply to oil areas, they should also be applied to HS areas as good engineering practice.

- All entrance doors or gates to an oil or HS area or building should be locked and/or guarded when the area is not in operation. (40 CFR 112.7(e)(9)(i))
- Any valves that permit direct flow of the contents of a tank or containment area to release into the environment should be securely locked in the closed position when not in operating or standby status. (40 CFR 112.7(e)(9)(ii))
- When pumps are not operating or on standby status, the starter control should be locked in the "off" position or located at a site accessible only to authorized personnel. (40 CFR 112.7(e)(9)(iii))

- The loading/unloading connections of transfer pipelines, including fill ports on underground tanks, should be securely capped or blank-flanged when out of service for an extended time. This also applies to pipelines that are emptied by draining or inert gas pressure. (40 CFR 112.7(e)(9)(iv))

Securing pump controls can be achieved with lockable control boxes, key-activated pump controls, remote pump controls or power-disconnect switches located in a securable building, or by the presence of on-site security personnel. In the event that physical barriers are not provided, many areas have a main power disconnect switch to the pumps to prevent the unauthorized use.

9.5. LIGHTING 112.7(e)(9)(v)

40 CFR 112.7(e)(9)(v) states that an area should have lighting that is commensurate with the type and location of the area. Lighting serves two purposes: the discovery of spills at night and the prevention of spills occurring through acts of vandalism. Emergency lighting may be required in the event of main power supply outages.

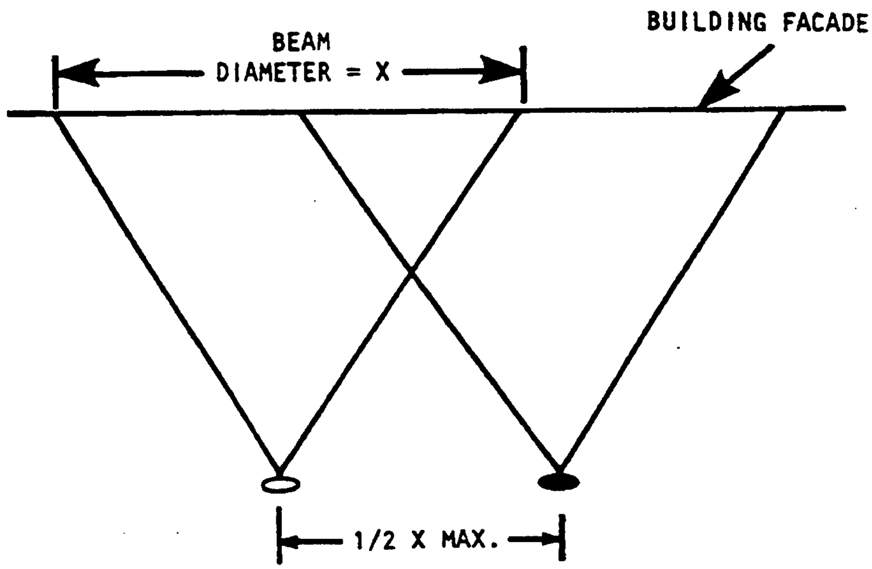
9.5.1. General Requirements

OSHA standards for work-place illumination ensure adequate lighting to prevent safety-related accidents and to protect worker health. SPCC (40 CFR 112.7(e)(9)(v)) regulations recommend sufficient lighting to detect unauthorized use of the area and chemical releases.

Proper and economical lighting design involves optimum lamp selection and projection distance to conserve energy and to lower installation and maintenance costs. Figure 9-1 shows the methodology for determining the spacing of area lighting for SPCC purposes. Other factors which determine the adequacy of a lighting system include lamp type, floodlight beam projection, mounting height, light spacing, and pole strength.

For security purposes, MIL-HDBK-1013/1A specifies minimum lighting criteria depending upon area and style of lighting. Typically, minimum lighting requirements for boundary or area lighting is in the range of 0.2 to 0.5 foot-candles of illumination. A portable light meter used at night will determine if an area has adequate lighting.

Areas which are not lighted, or are inadequately lighted, should be upgraded to at least the minimum standards. In correcting lighting deficiencies, the engineer is often restricted by the design feature of the existing system (i.e. pole height), and the optimum solution may not be practical or economically feasible. Where additional lighting is required, it should be designed and constructed in accordance with MIL-HDBK-1013/1A.



Source: Spill Prevention and Fail-Safe Engineering for Petroleum and Related Products, J. L. Goodier, Copyright 1983. Used by permission of Noyes Publications.

Figure 9-1
Light Beam Overlap Criteria

9.5.2. Lamp Selection

Lamp selection has a significant impact on performance and cost. The performance of a lamp or type of lamp can be judged according to several different criteria. The most commonly used are efficacy, color rendering, color appearance, and lumen maintenance. The two types of security lighting most commonly used are incandescent or high-intensity discharge (HID) lamps. There are three types of HID lamps: mercury vapor, metal halide, and high-pressure sodium. The characteristics of these lights vary widely among different manufacturers. Individual manufacturers and vendors should be contacted regarding initial and O&M costs and performance efficiency of specific lamp models.

The incandescent or filament lamp is the most common, but HID lamps are more energy efficient. Incandescent lamps start quickly, and HID lamps tend to take from one to several minutes to start and from several minutes to 15 minutes to reach full intensity. HID lamps are more likely to create an audible hum. Advantages and disadvantages of each type are shown in Table 9-1.

9.6. SECURITY PATROLS

Including chemical storage and handling areas in routine base security patrols or dedicating security personnel to those areas during non-duty hours adds an extra level of security protection. Security personnel can be instructed to observe leaks from tanks, valves, or pipelines while patrolling the installation. Briefing security personnel on how recognizing potential spill situations and chemical hazards, on the location and operation of fire protection equipment and alarms, and on procedures to follow when a spill is detected, is also highly recommended.

Table 9-1
Lighting Type Characteristics

Lighting Type	Efficiency Rating (Lumens per Watt)	Life (Hours)	Other Considerations
Incandescent	10 to 20	1,000 to 3,000	inexpensive reliable good lighting control simple to install
Mercury vapor	32 to 63	24,000	low O&M cost initial high cost blue-green color requires complex starting equipment
Metal halide	80 to 125	4,500 to 20,000	restart time of 2 to 4 minutes restrike time of 10 to 15 minutes best overall color rendering extremely compact requires complex starting equipment
High-pressure sodium	40 to 140	24,000	restrike time of 1 minute most economical system based on total initial and O&M costs requires complex starting equipment emits an orange colored light.

CHAPTER 10

ADMINISTRATION

10.1 INTRODUCTION

In addition to the spill prevention structures and equipment, an area must be run properly to minimize the human factor as the cause of a spill so that spills will be promptly detected and cleaned up. Proper administration involves appointing a installation-wide spill prevention coordinator to oversee SPCC issues, such as employee training and briefings, standard operating procedures and inspections, and necessary record keeping.

The critical elements of operational and administrative requirements of a spill prevention plan under the CWA (40 CFR 112) regulations can be categorized as follows:

- Spill Reporting
- Visual Inspections
- Preventive Maintenance
- Good Housekeeping
- Standard Operating Procedures
- Employee Training
- Documentation and Records

These practices are necessary and effective elements of any successful spill prevention program.

10.2 SPILL PREVENTION RESPONSIBILITIES 112.7(e)(10)

OPNAVINST 5090.1 states that the activity commanding officer is responsible for preparation and implementation of the SPCC plan; however, the commanding officer usually delegates the SPCC implementation to the activity's environmental coordinator. The responsibilities include insuring that facilities are surveyed, an SPCC plan is prepared, and a spill prevention coordinator has been appointed for each of the activity's oil facilities. In addition, the activity commanding officer or his delegate should update and amend the SPCC plan as required.

In accordance with 40 CFR 112.7 (e)(10)(ii), each oil area should have a person designated as the spill prevention coordinator. This person is responsible for oil spill prevention. The spill prevention coordinator must ensure that his personnel are properly briefed on the area's SPCC plan, that spill prevention procedures and inspections are being implemented, and that comprehensive and consistent spill prevention records are being maintained.

10.3 SPILL PREVENTION TRAINING

112.7(e)(10)(i)
112.7(e)(10)(iii)

The Area Spill Prevention Coordinator ensures that SPCC training is conducted. The objective of a spill control training program is to reduce the number and volume of spills. The training program should consist of a formal training session and regular follow-up briefings to update and reinforce the formal training. The training is to instruct area personnel on the SPCC plan and in the proper operation and maintenance of equipment and in the applicable pollution control laws, rules, and regulations.

Examples of overheads from a recent SPCC training course presented at a Navy facility is presented in Appendix L. The primary intent of SPCC training is to educate personnel on the purpose, site applicability, regulatory intent, operational requirements, inspection procedures and response mechanisms that embodies a well organized spill planning and response program. The example overheads presented in Appendix L meet the intent of this training in addition to providing site specific details that area operators and managers require in their daily implementation of spill prevention planning. It is suggested that these example overheads be employed as a first step in the development of a site specific training program by environmental managers at their area.

Personnel such as operators, security guards, and delivery truck drivers must be aware of the relationship between their daily activities and spill prevention. The training may be incorporated into the regular job training or it may be taught separately; however, to emphasize the importance of spill prevention, it should be a separate subject.

Semiannual briefings are recommended; however, some facilities may need monthly briefings. The frequency of briefings is influenced by the turnover and experience of personnel, the sophistication and mission of the area, the potential and history of discharges, the spill response capabilities, the potential environmental impact of a spill, the surrounding community, and mission readiness. When a new employee or piece of equipment arrives; daily briefings may be appropriate until the new employee or equipment has become fully incorporated into the operation.

The following topics should be addressed during area briefings:

- Area SPCC plan
- Recent spills at the area, or similar area, causes, and corrective actions taken
- New spill prevention measures, equipment, and safety procedures

- Upcoming new equipment installations that might impact spill control planning or implementation
- Chemical and physical properties of stored materials
- Emergency procedures
- Inspection procedures
- Overview of regulations
- Safety and health

10.3.1 Chemical and Physical Properties of Stored Materials

Personnel involved with the transportation, storage, or use of oil or HS should be familiar with the chemical and physical properties of these materials. The physical properties determine the care and attention necessary to prevent spills and to avoid potential hazards such as reactions between incompatible materials, fire, explosion, and adverse health reactions.

10.3.2 Emergency Procedures

The training program should familiarize personnel with emergency procedures, equipment, and systems which are applicable to their positions. Emergency response procedures to be taught to personnel include:

- Using, inspecting, repairing, and replacing emergency monitoring equipment.
- Key parameters for automatic shutoff systems.
- Communications equipment and alarm systems.
- Response to fires or explosions.
- Response to spills on land and spills reaching water.
- Evacuation and shutdown of operations.
- Whom to contact in the event of a spill and how to implement the activity spill contingency plan.
- Types of protective equipment or clothing to be worn.
- Basic first aid.
- Who to inform in the event of an emergency.

10.3.3 Inspection Procedures

Detailed inspection procedures are discussed in Section 10.5. Inspection procedures should be written and included in the SPCC plan. Supervisory personnel should be aware of the required inspections, while other activity personnel should be briefed on the particular inspections they will be subject to or required to conduct. Inspection forms should be presented to personnel, and a sample inspection should be

demonstrated.

10.3.4 Overview of Laws and Regulations

Area personnel should be aware of local and federal laws and regulations that impact their duties and responsibilities. The federal laws applicable to spills include:

- Federal Water Pollution Control Act (FWPCA); authorized the Environmental Protection Agency (EPA) to prepare the oil spill prevention regulations contained in 40 CFR 112.
- Occupational Safety and Health Act (OSHA); authorized the preparation of safety regulations included in 29 CFR Parts 1910, 1915-1917, 1926, and 1960.
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); authorized the EPA to promulgate the following regulations pertaining to the cleanup of oil and hazardous substance spills: 40 CFR Parts 300, 302, 305, and 306.
- Public Health Regulations, established by the Department of Health and Human Services, concerning occupational health and safety and included in Title 42 of Code of Federal Regulations.
- Hazardous waste regulations for generators and storage facilities as required in 40 CFR Parts 262, 264, and 265.
- Underground storage tank regulations in 40 CFR 280.
- State and local SPCC, HS, and fire regulations.

10.3.5 Safety and Health

Much of the training already discussed will incorporate safety and health concerns. However, personnel will also need to be trained in the proper use and operation of personal protective equipment, deluge showers and eyewashes, and monitoring systems. Area personnel should be familiar with all OSHA standards that apply to their job position.

10.4 STANDARD OPERATING PROCEDURES

Any standard operating procedures (SOPs) for individual facilities should be written, and in some cases posted. Both CWA (40 CFR 112) and RCRA (40 CFR Subparts I and J) regulations require that oil and HS facilities and equipment be designed and operated to prevent spills. Based on this broad definition, SOPs should apply best management practices and legal requirements to minimize spills.

The inspections required by 40 CFR 112.7(e)(8) include:

- releasing containment drainage without treatment;
- AST supports and foundations;

- visual inspections of ASTs;
- aboveground pipelines and valves; and
- buried pipelines when exposed for any reasons.

In addition to the specific SOPs identified in 40 CFR 112, area supervisors should identify additional operations, such as tank water draining that require standard procedures to avoid a spill.

Minimum written standard operating procedures are presented in Appendix G for the following operations: General Loading/Unloading Procedures; Specific Tank Truck Procedures; Specific Railroad Tank Car Loading/Unloading; Specific Ship/Shore Loading/Unloading Procedures; Containment Area Draining Procedures; and Tank Water Draining Procedures. Similar SOPs should be developed, when the situation warrants, for key operations and practices such as good housekeeping, inspection and maintenance of liquid level gauges, and record keeping.

10.5 INSPECTIONS

112.7(e)(1)(ii)
112.7(e)(2)(vi)
112.7(e)(2)(ix)
112.7(e)(3)(iv)
112.7(e)(8)

40 CFR 112 requires that inspections be a regular part of an SPCC program. The purpose of inspections is to detect potential equipment problems that can lead to spills. Inspection frequency varies depending on the use of the equipment, however, weekly and monthly inspections are common. Equipment items designated by 40 CFR 112 as requiring regular inspections include:

- Tanks
- Level Control Systems
- Drainage Control Systems
- Accumulated Rainwater
- Aboveground Pipelines and Valves

In addition to inspections required by 40 CFR 112, other storage and transfer systems and components should be inspected to assure that they are operating as designed; these additional inspections should be included in the SPCC plan as appropriate. These systems and components are:

- Transfer Systems Instrumentation Control
- Loading and Unloading Racks
- Spill Containment
- Oil/Water Separators

Inspection procedures should be added for additional equipment as required.

During inspections, area personnel may discover deficiencies in equipment or in procedures; these should be reported to the SPCC coordinator. A spill may not have occurred, but a potential spill hazard exists. Repair or maintenance will reduce the hazard.

A good preventive maintenance program at oil and HS storage and handling facilities ensures that the equipment and facilities are maintained in an operational and safe condition. SPCC preventive maintenance should not be a substitute for routine maintenance practices required on dynamic equipment such as lubrication of movable parts and replacement of bearings.

Preventive maintenance is an intrinsic part of a spill prevention inspection program. Through inspections, worn or damaged equipment can be identified before a failure occurs. Therefore, deficiencies noted during an inspection must be corrected and followed by preventive maintenance. Use the inspection forms in Appendix E to record any action taken to repair any deficiencies discovered during inspection. This form serves as a record to show that repairs were made.

10.5.1 Visual Inspections

Visual inspection is the simplest way to detect broken, corroded, or deteriorated facilities and equipment. Since faulty or deteriorated conditions lead to failure and spillage, their early detection and correction is necessary to prevent spills. Visual inspection is also effective as a monitoring tool to evaluate procedural practices.

Oil and HS facilities and equipment must be visually inspected at specified intervals for leaks or conditions that could lead to releases. In particular, visual inspections should at a minimum include examining the following elements:

- Tanks, pipes, valves, fittings, pumps, and hoses
- Process and material handling areas and equipment
- Loading and unloading operations
- Spill control structures and materials
- Drainage treatment systems

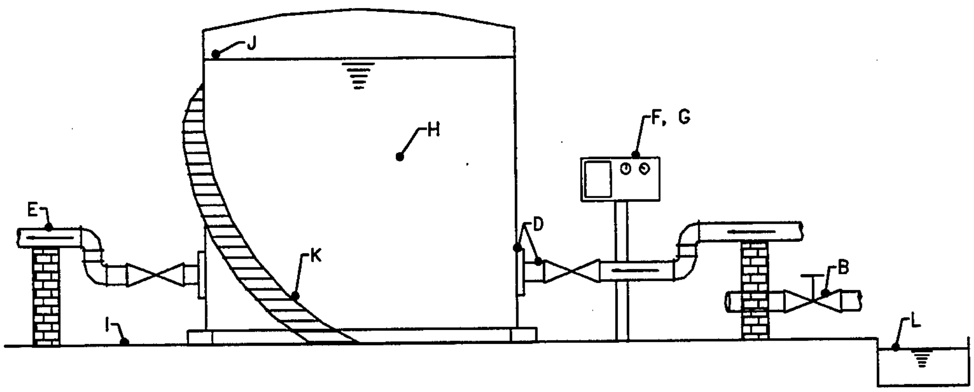
These inspections should be incorporated into the facilities existing preventive maintenance program. The frequency of visual inspection should be based on the chemical involved, area or equipment age, secondary containment, and the potential impacts of a loss. Sometimes legal requirements will determine the frequency of inspection of a particular type of equipment or operation. Appendix E contains inspection checklists for the facilities and equipment discussed above. The checklists reflect Federal requirements and good engineering practices. These forms can be modified to reflect each activity's specific conditions.

10.5.2 Tanks

Under 40 CFR 112.7(e)(vi), aboveground tanks should be visually inspected at

frequent intervals for deterioration. For RCRA HW tanks, daily inspections of aboveground tanks, areas around tanks and secondary containment, data from monitoring and leak detection equipment, and regular inspections of overfill control equipment are required. (40 CFR 264.195)

Visual inspections of tank exteriors should include tank walls, foundations, protective coatings, pipe connections, ground connections, and valves. Figure 10-1 and Figure 10-2 show the major areas of concern for aboveground tanks.



Code	Legend	Code	Legend
A	Tank fill valve should be in the closed position and locked when not in use.	H	The tank shell surface should be visually inspected for areas of rust, or other deterioration. Particular attention should be paid to peeling area, welds and seams.
B	The gate valve used for emptying the dike containment area should be of the hand–operated variety only and should be closed and locked at all times.	I	The ground surface inside the diked area should be checked for obvious signs of leakage or spillage.
C	All valves should be inspected for signs of leakage or deterioration.	J	The liquid level sensing device should be checked to insure that there is adequate freeboard.
D, E	Inlet and outlet piping, as well as tank flanges should be checked for leakage and to insure that adequate support is provided.	K	External stairways and walkways should be checked to insure that they are unobstructed and sound.
F, G	Automated fill control and discharge control equipment should be checked to see that it is operating properly.	L	The oil/water separator should be checked for adequate freeboard and to insure that it is operating properly.

Figure 10-1
Areas Of Concern In Typical Aboveground Vertical Tank System

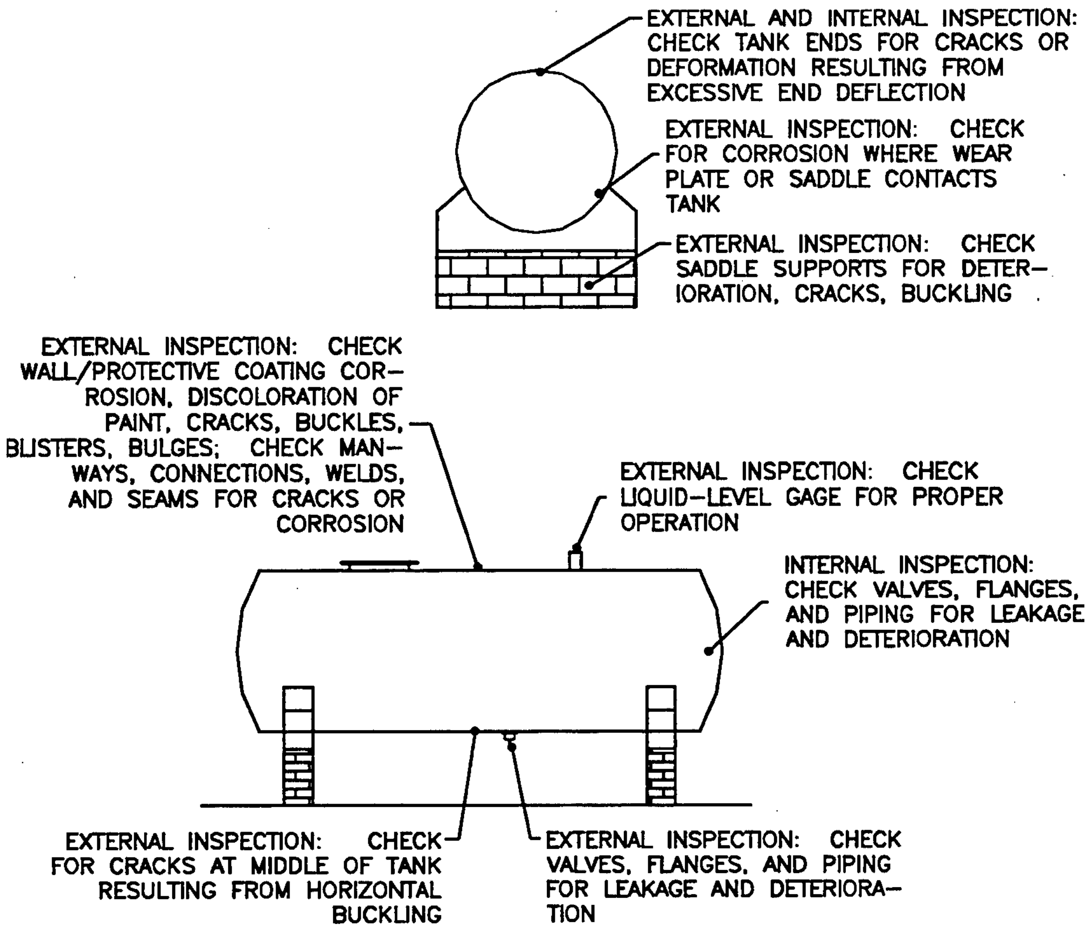


Figure 10-2
Areas Of Concern In Typical Horizontal Tank System

Tank walls should be inspected for leaks, cracks, buckles, and bulges. Leaks can be spotted by a discoloration of paint in the area below the leak. Cracks are found at nozzle connections, in welded seams, access manholes, and underneath rivets. The seating surface of valve connections on the tank should be in good condition and free of corrosion. If a deficiency is evident from an inspection, integrity testing techniques discussed in Section 4 should be used to determine the extent of the problem. If the situation appears serious, the tank should be taken out of service immediately and the necessary repairs made.

Deterioration of supports and foundations, such as erosion and uneven settlement, should be detected and corrected before serious damage occurs. Figure 10-3 shows the major areas of concern for a typical tank foundation. Figure 10-4 shows the adverse effects of differential settlement on the operation of tank level gauges and high-level alarms.

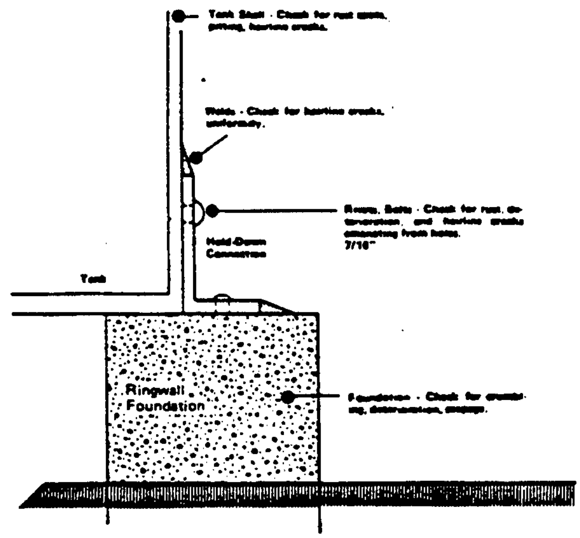


Figure 10-3
Areas Of Concern In Typical Tank Foundation

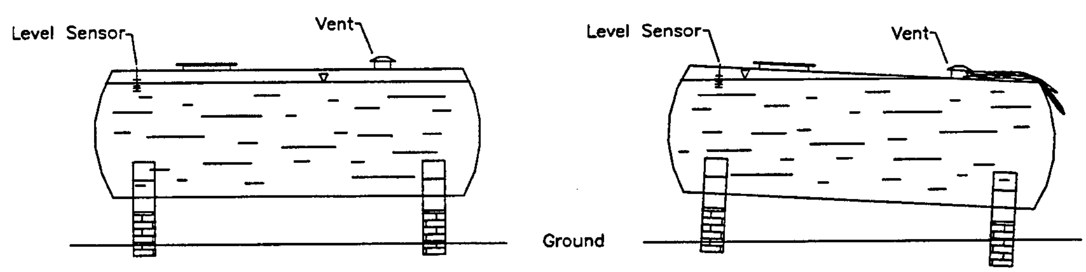


Figure 10-4
Effect Of Differential Settlement On Overfill Protection Devices

Concrete pads, base rings, and piers should be checked for cracks and spalling. The joint between tank bottom and concrete pad or base ring should also be checked for integrity and proper seal against water seepage. Wooden tank supports should be inspected for rot by hammering.

For horizontal tanks, give special attention to saddle supports for deterioration, cracks or buckling, wear plate or saddle contacts with the tank for possible corrosion, and tank ends for cracks or deformation due to excessive end deflection. Serious foundation settlement is usually indicated by distortion of anchor bolts, buckling of columns or supports, and excessive concrete cracking.

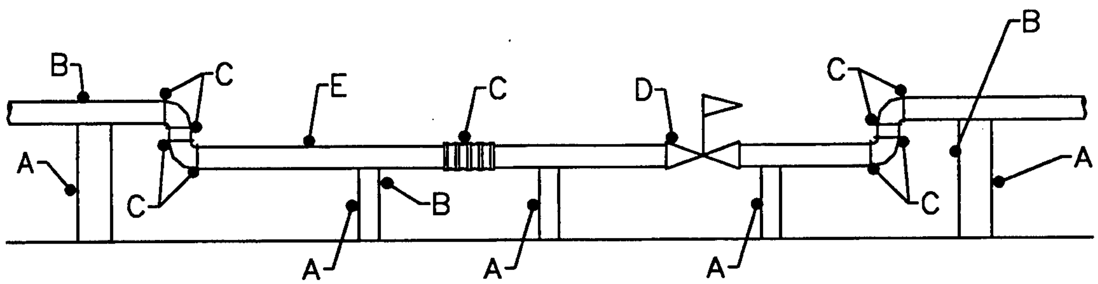
Level sensing devices should be checked at least weekly (daily for HW tanks) by operating them. These devices must be tested on a regular basis and the results recorded. Also, an operator must monitor each filling operation.

Internal visual inspections require that a tank be empty, safe to enter, and a

confined space entry permit has been issued. Tanks should be examined internally (walls and bottom) for holes, cracks, splits, or similar deterioration. Red-flagged conditions should be assessed and confirmed by testing and repaired accordingly.

10.5.3 Pipes, Valves, Fittings, Pumps, and Hoses.

Both 40 CFR 112.7(e)(3) and 40 CFR 264 require visual inspection of aboveground piping systems and recommend periodic examination and preventive maintenance for pumps. HW pipes associated with tanks or incinerators require daily inspections. Figure 10-5 shows the major items which should be visually inspected for aboveground piping systems.



A – CHECK PIPE SUPPORTS FOR DAMAGE/DETERIORATION

B – CHECK CONTACT POINTS AT SUPPORTS FOR EXCESSIVE WEAR AND CORROSION

C – CHECK FITTINGS, FLANGES, JOINTS, EXPANSION DEVICES FOR SIGNS OF LEAKS, BROKEN OR MISSING PARTS, LOOSE NUTS AND BOLTS, CORROSION, TIGHTNESS, MISALIGNMENT

D – CHECK PRESSURE RELIEF VALVE FOR TIGHTNESS, INTEGRITY, EXCESSIVE WEAR, CORROSION, CALIBRATION (SEE FIGURE 3–9)

E – CHECK PIPING FOR DETERIORATION OF COATING, CORROSION, PHYSICAL DAMAGE BY OUTSIDE FORCES, EXCESSIVE MOVEMENT, VIBRATIONS

Figure 10-5
Areas of Concern In Typical Aboveground Piping System

Pipes and appurtenances are subject to erosion or wear due to the effects of high liquid turbulence or velocity and abrasion on pipe supports from expansion and contraction. Leaks frequently occur around bends, elbows, tees, orifice plates and throttling valves. inspections include checking for misalignment, unsound supports, corrosion, vibration and swaying during operation, liquid accumulations, and thickness testing.

Visual inspection of pumps should include checking for foundation cracks and uneven settling, leaky pump seals, excessive vibration and noise, excessive dirt or corrosion, deteriorating insulation, and burning odor or smoke. All assembly bolts, gaskets, cover plates, and flanges should be checked for leaks and cracks. Vibration levels should be measured periodically using an electronic vibration meter to avoid harmful levels.

Figure 10-6 through Figure 10-12 show critical areas of various types of valves which should be inspected.

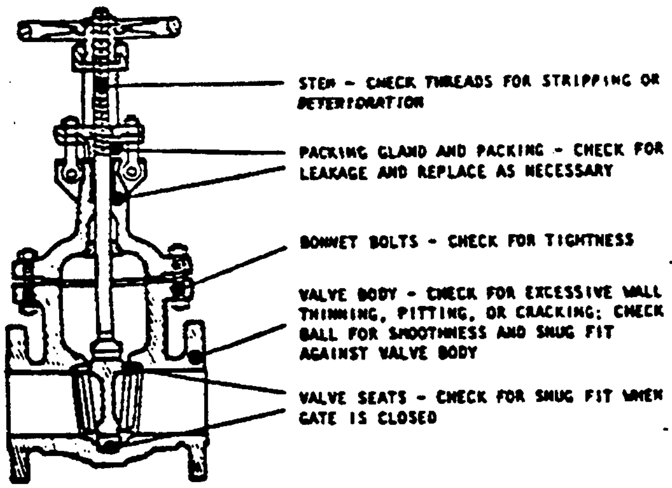


Figure 10-6
Critical Areas Of Gate Valves

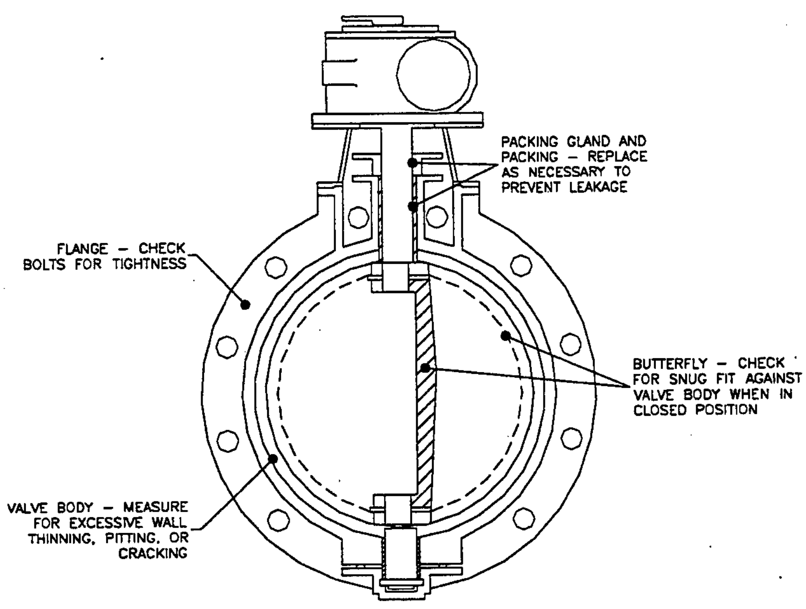


Figure 10-7
Critical Areas Of Butterfly Valves

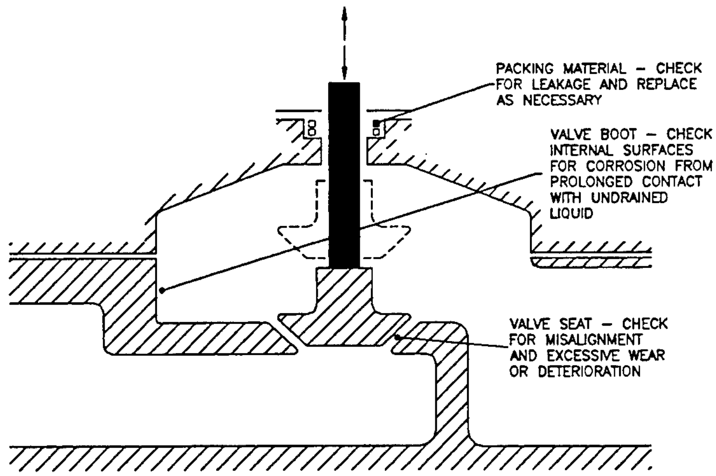


Figure 10-8
Critical Areas Of Globe Valves

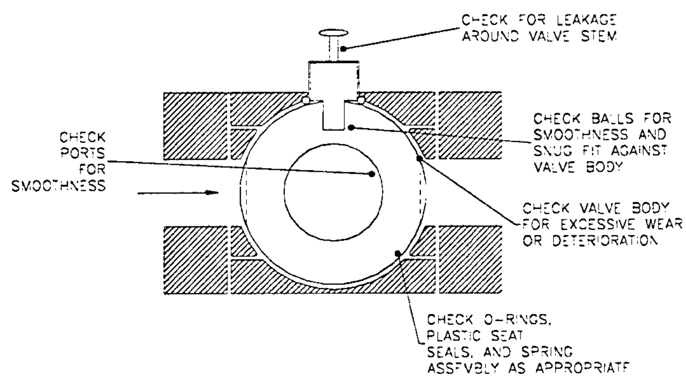


Figure 10-9
Critical Areas Of Ball Valves

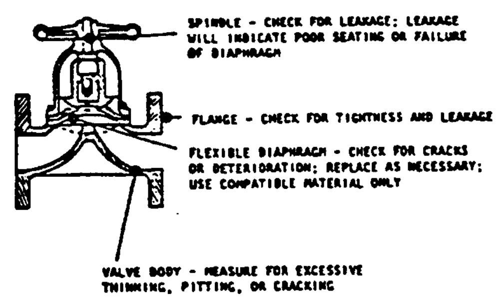
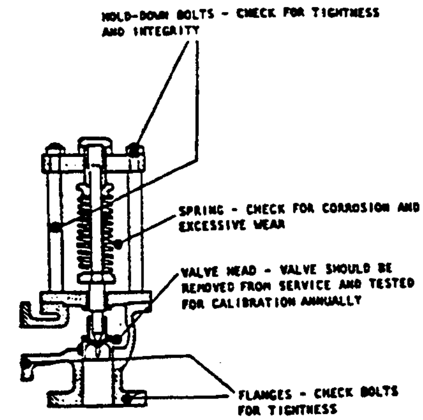


Figure 10-10
Critical Areas Of Pressure Relief Valves



Source: Toxic Substance Storage Tank Containment, Ecology and Environment, Inc., Copyright [illegible]. Used by permission of Noyes Publications.

Figure 10-11
Critical Areas Of Diaphragm Valves

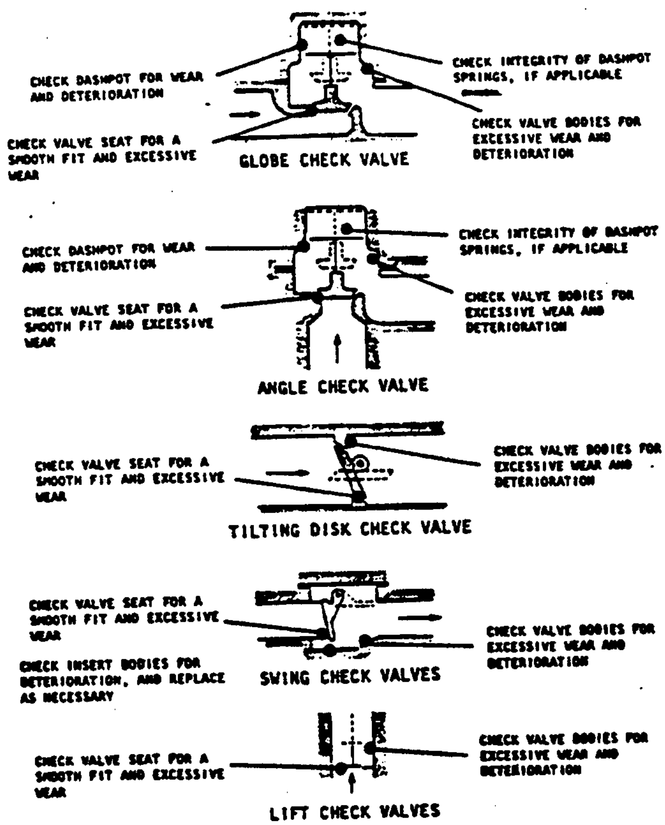


Figure 10-12
Critical Areas Of Check Valves

Hoses used in loading or unloading operations should also be inspected for wear and tear or damage caused by vehicles.

10.5.4 Drums and Smaller Container Areas

RCRA (40 CFR 264.174) requires weekly visual inspections for deterioration, leaks, and spills of drums and small container storage areas. These areas should be inspected for:

- Proper and compatible storage of chemicals,
- Integrity of containers, floors, racks, pallets, walls and containment structures,
- Protection against accelerated corrosion and weathering,
- Proper condition and use of material handling and transfer equipment,
- Orderly and clean storage and work areas,
- Proper and unobstructed aisle space, and
- Proper handling of chemicals.

10.5.5 Spill Control Structures and Materials.

Secondary containment and drainage structures should be inspected for liquid accumulations or spills, vegetation growth, cracks, breaches or erosion on the impermeable coating, obstructions, and closed release valves. The general condition of sumps, drains, catch basins, drip pans, valves, sorbents, and permanent booms in ditches and open waters should be assessed.

Surface impoundments regulated under RCRA must be routinely inspected to identify problems with dikes and level control systems before failure occurs. Impoundments should be inspected weekly and after a heavy storm event to detect severe erosion, deterioration of dikes, malfunctions, or improper operation of overtopping control systems.

10.5.6 Specialized Equipment and Operations

Corrosion protection systems are also required, by 40 CFR 112, 40 CFR 264, and DM-22, to be inspected and maintained on a regular basis. Visual inspection, study of maintenance records, soil resistivity measurements, structure-to-soil voltage measurements, and cathodic protection current requirements are established procedures. The date the corrosion protection system was last inspected or maintained should also be noted. Cathodic protection systems must be inspected at least once a year (6 months after installation). Additional information on corrosion protection can be found in DM-22, API Publication 1632, NACE RP-02-85 (1995), NACE RP-01-69 (1992), STI P3 (1993), Underwriters Laboratories Standard 1746, and Underwriters Laboratories of Canada CAN4-G03.1-M85.

10.6 RECORD KEEPING REQUIREMENTS

112.3(e)
112.7(e)(2)(iii)(D)
112.7(e)(8)

Record keeping is a vital aspect of the SPCC plan. Good record keeping is essential for compliance with the legal requirements of 40 CFR 112 and 264 and for protection against possible litigation arising from a spill. Records are also a valuable source of information reevaluating spill prevention methods, equipment, and procedures. 40 CFR 112.7(e)(8) requires record keeping in the form of the original SPCC plan and all updates and supplements, inspection and test records, containment draining records, and spill reports. These records must be well organized and must be readily accessible at the area.

40 CFR 112.3(e) requires owners and operators to maintain a copy of the SPCC plan <u>at the area</u> if it is normally attended 8 hours per day, or at the nearest field office if the area is not attended. The SPCC plan must be available on-site during working hours.

Adequate records should be maintained to document when in-plant drainage or rainwater is discharged from the area without treatment. Drainage and inspection records should be signed by the appropriate supervisor or inspector and made a part of the SPCC plan. Records should be maintained for testing of corrosion protection systems, spill control monitoring equipment, tank and pipe components, and spill control structures. 40 CFR 112.7(e)(8) requires that all applicable written inspection records, signed and dated by the person conducting the inspection and the authorizing supervisor, be maintained for a period of 3 years.

Record keeping is of extreme importance in keeping track of the age, lifespan, and condition of spill control and prevention equipment, so that adjustment, repair, or replacement can be done at the proper intervals. The existing piping pressure testing procedures and records should be reviewed when the annual testing is performed. Lack of testing procedures or records of annual testing may constitute a deficiency.

The existing records should be checked for completeness and accuracy. If any required records have not been kept, procedures for keeping them should be instituted as soon as possible. If records have not been kept together, make an effort to locate and consolidate them. When record keeping responsibilities are scattered among different commands make sure these are coordinated, particularly when record keeping is required by law.

While not required by the SPCC regulation, it is to the advantage of the spill prevention coordinator to maintain the following types of records:

<u>Operational Security Patrol Records.</u> Security personnel should be aware of the need for SPCC security inspections and should maintain appropriate records of their patrols and observations.

Training Documentation. It is not the responsibility of the spill coordinator to maintain SPCC training documentation; however, the spill coordinator should ensure that the training office is aware of the need to maintain SPCC training documentation to indicate compliance with the SPCC training requirements. It may be useful for the SPCC coordinator to maintain simplified training records for ready reference.

Employee training records of the type, extent, and frequency of training each employee has received, must be kept for all HW personnel under 40 CFR 264.16. Training records must be kept until closure of the regulated area, or until three years after the date the employee last worked at the site. All contractor personnel working at the facilities must provide evidence of any training required by law prior to being allowed to work. Contractor personnel training is the responsibility of the contractor and should be designated so in the contract documents.

Repair Records. The staff Civil Engineer should maintain all SPCC-related equipment repair records. However, it may be useful to keep a copy of the repair record for spill control devices with the SPCC records.

Preventative Maintenance. Most SPCC preventative maintenance should be done with routine maintenance, and the records kept with area maintenance records. The SPCC coordinator should keep a copy of the maintenance records.

10.7 SPILL REPORTING

Spill reporting is required under Section 311(b)(5) of the FWPCA and is an essential tool for spill prevention and expeditious response to potential or actual spills. A spill reporting system serves the following purposes:

- Notify appropriate area personnel to initiate immediate action.
- Ensure timely notification to all Navy commands and regulatory agencies.
- Identify and correct causes to prevent or minimize recurrence.
- Identify necessary revisions to the SPCC plan.

The names, titles, and duty/off-duty telephone numbers of key area and activity personnel to whom spills must be reported is included in the SPCC plan. A similar list contains contacts at regulatory agencies and other concerned authorities/organizations to be notified and the circumstances that require their notification.

10.8 PREVENTIVE MAINTENANCE

Visual inspections help identify the need for preventive maintenance. Preventive maintenance under the SPCC plan provides the mechanisms for systematically correcting problems.

All Navy installations must perform periodic maintenance of mission support facilities and equipment to insure their safe and effective operation. Maintenance and repairs to correct spill prevention deficiencies should be made an integral part of the

existing preventive maintenance program. Maintenance and repairs of spill prevention deficiencies should include:

- Confirmation and assessment of deficiencies red-flagged during visual inspections (through testing or other means)
- Replacement or repair of deteriorated parts and equipment to prevent potential or imminent failure
- Periodic nondestructive testing of tanks and piping systems

10.9 GOOD HOUSEKEEPING

Good housekeeping reduces the possibility of accidental spills caused by mishandling of equipment and materials, facilitates detection of spills and leaks, and reduces safety hazards.

Good housekeeping practices are applicable to all material storage and handling areas, and should at least include:

- Neat and orderly storage of chemicals
- Separate storage of incompatible chemicals
- Proper and immediate labeling of all materials and containers
- Closed containers except when adding or removing from the container
- Maintenance of dry and clean floors
- Maintenance of spill response equipment
- Prompt and thorough removal of small spillage
- Segregation of waste streams
- Routine garbage and rubbish pickup and disposal
- Provisions for storage of containers or drums to keep them from protruding into open walkways or pathways
- Vehicular routes and aisle spaces kept clear at all times

Figure 10-13 illustrates common areas of concern relevant to good housekeeping practices.

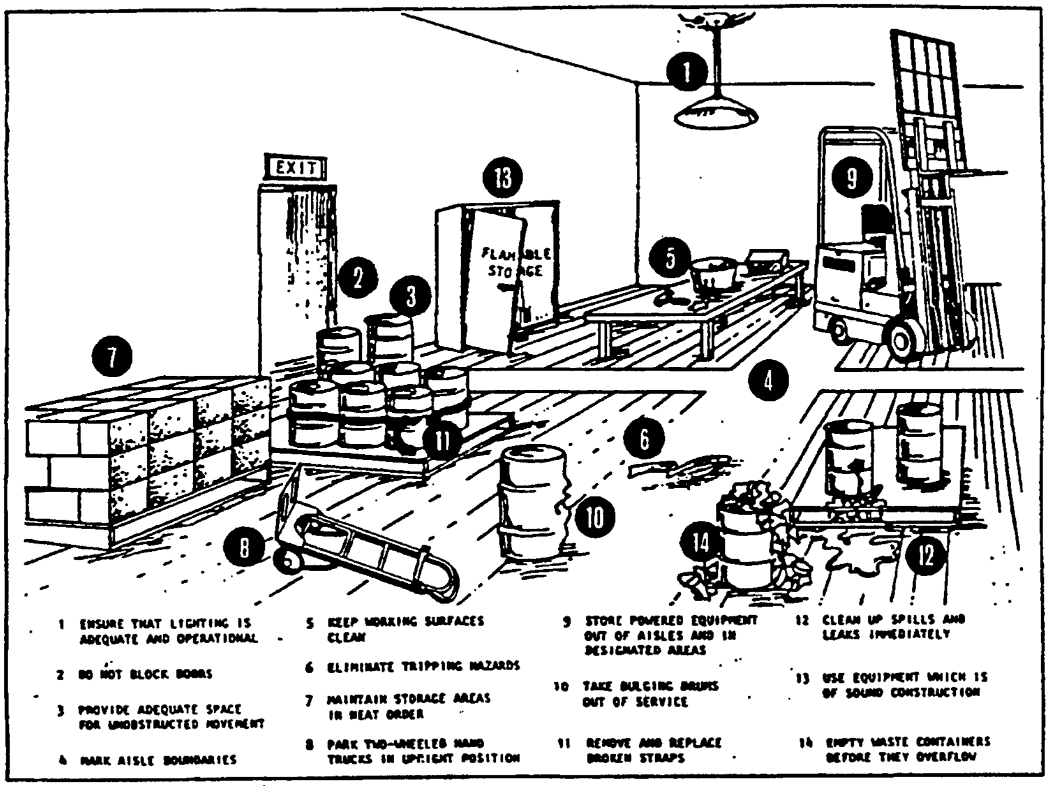


Figure 10-13
Areas Of Concern Relevant To Good Housekeeping Practices

Supervisors should stress employee awareness of potential environmental and safety hazards from improper housekeeping practices. Discussing good housekeeping during inspections and at employee orientation meetings, and publicizing the program through the use of posters, suggestion boxes, and publications, are effective ways to maintain employee interest in good housekeeping practices.

10.10 EMPLOYEE TRAINING

Employee training is a specific requirement of spill prevention under both 40 CFR 264.16 and 40 CFR 112.7(e)(10). All personnel, including contractors working at potential spill sites, must take part in periodic spill prevention and response training programs. The SPCC plan should designate the major features of the programs, including basic and specialty training for spill sensitive operations. Training should consist of formal classroom training (preferably a course approved by the regulatory agency), on-the-job training, spill exercises and employee briefings, and an awareness program.

10.10.1 Basic Training

Personnel working with oil and HS, at all levels of responsibility, must have a minimum knowledge of spill prevention:

- The content and use of the SPCC plan.
- Processes and oil and HS with which they work, SOPs, and safety practices required.
- Evacuation procedures and First Aid.
- Personal protective equipment requirements, use and maintenance.
- Use and maintenance of alarms and monitoring equipment that impact spill prevention and response.
- Chemical compatibility, potential results of mixing incompatible chemicals, and use of compatibility matrices.
- Visual inspection requirements, as described in Section 10.5.1 (supervisors must be fully cognizant of the particulars of every required inspection).
- Good housekeeping requirements as outlined in Section 10.9.

SPCC training can often be combined with other training programs, such as fire or safety. RCRA regulations (40 CFR 264.16) mandate the following training schedules:

- Once a year for all personnel.
- Within six months for all personnel starting in a supervised position.
- Before starting work for personnel entering an unsupervised position.

In addition, employee training should be considered when the following occurs:

- After revision of training requirements in applicable laws.
- After significant area modifications in oil and HS and processes, which could affect spill prevention and response.
- After spill response operations in which training deficiencies were noted.

Employee briefings should also be performed to assure adequate understanding of the SPCC plan and each employee's individual responsibilities. These briefings should highlight known spill events or failures, malfunctioning components, recently developed precautionary measures, and the SPCC plan.

10.10.2 Specialty Training

Knowledge of spill occurrences is important in reducing human errors or process upsets that can lead to spills. Specialty training should be provided for highly-sensitive jobs such as tank end loading/unloading (pump) equipment operators, HW area operators, industrial processes personnel, maintenance workers, and vehicle (tank truck) operators. Many of these trades require licenses and/or passing examinations to operate.

The following considerations should be kept in mind regarding specialty training:

a) Maintenance workers are vital to the spill prevention program. Because of their knowledge and exhaustive coverage of facilities and operations, they are (or

should become) the eyes and ears in spill prevention and advanced detection of potential leak sources. They should have intimate knowledge of weak areas in the program. Alternating maintenance workers to conduct inspections and maintenance surveys is recommended to gain different viewpoints.

b) RCRA regulations require all personnel working with HW to complete classroom or on-the-job training on performing their job in compliance with RCRA requirements. This training shall be conducted or overseen by someone familiar with oil and HS spill prevention and response as required by RCRA.

c) HS transport vehicle operators should be knowledgeable about DOT regulations (49 CFR 171) governing HM transport in public highways and RCRA regulations (40 CFR 263) for transporting HW. RCRA requires a permit and identification number to transport HW over public highways and certification of truck operators. Oil and HS transport vehicle operators should, at minimum, be trained in procedures to inspect their vehicle daily and prior to every shipment, loading/unloading SOPs, and emergency response actions to minimize or contain a spill during transport. New operators should be supervised closely until they have successfully completed a number of loading/unloading operations and other critical tasks.

d) Emergency response personnel should have special training in emergency procedures and protective equipment for response to spills, fires and explosions, standard operating safety procedures, personnel decontamination procedures, and cleanup techniques. They should also be familiar with the area or site emergency response plan, evacuation plan, and the location of communication or alarm systems, process controls and shutoff valves, fire extinguishers, sorbents, neutralizing agents, and other equipment as appropriate.

e) HW workers require training in health and safety aspects of handling HW. These include the application and use of personnel protective equipment (PPE), limitations of PPE, and personnel decontamination procedures. They should be familiar with chemical hazards, exposure limits and toxicology of chemicals, incompatible chemicals and the hazards of mixing incompatible chemicals. They should be familiar with chemical handling procedures, chemical monitoring equipment, and emergency response procedures.

APPENDIX A
ACRONYMS AND GLOSSARY

Acronyms

ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
BMP	Best Management Practice
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CNO	Chief of Naval Operations
CPE	Chlorinate Polyethylene
CSPC	Chlorosulfonated Polyethylene
CWA	Clean Water Act
DFM	Diesel Fuel Marine
DM	Naval Facilities Engineering Command Design Manual
DOD	Department of Defense
DOI	Department of Interior
DOT	U.S. Department of Transportation
EFD	Engineering Field Division
EPA	U.S. Environmental Protection Agency
EPDM	Ethylene Propylene Diene Monomer
FEMA	Federal Emergency Management Agency
FRP	Fiberglass Reinforced Plastic
FWPCA	Federal Water Pollution Control Act (Also known as the Clean Water Act)
gal	gallons

gpm	gallons per minute
HID	High Intensity Discharge
HM	Hazardous Material
HPS	High Pressure Sodium
HS	Hazardous Substance
HW	Hazardous Waste
NACE	National Association of Corrosion Engineers
NAVFAC	Naval Facilities Engineering Command
NCP	National Contingency Plan (40 CFR 300)
NDF	Navy Distillate Fuel
NFESC	Naval Facilities Engineering Service Center
NFGS	Naval Facilities Engineering Command Guide Specification
NFPA	National Fire Protection Association
NPDES	National Pollution Discharge Elimination System
NRC	National Response Center
O.D.	Outside Diameter
OPNAVINST	Chief of Naval Operations Instruction
OSHA	Occupational Safety and Health Act
PCBs	Polychlorinated Biphenyls
PE	Professional Engineer
POL	Petroleum, Oil and Lubricants
ppm	Parts Per Million
PVC	Polyvinyl Chloride
RCRA	Resource Conservation and Recovery Act
ROICC	Resident Officer in Charge of Construction
SCC	Spill Control Committee
SIC	Standard Industrial Classification
SOP	Standard Operating Procedure
SPCC	Spill Prevention, Control, and Countermeasures
STI	Steel Tank Institute

TSCA	Toxic Substances Control Act
UIC	Uniform Identification Code
UL	Underwriters Laboratory
USCG	United States Coast Guard
UST	Underground Storage Tank

Glossary

ABOVEGROUND STORAGE TANK (AST). A tank entirely above grade (natural or otherwise). *(Note: for purposes of the SPCC regulation, the EPA arbitrarily defines partially buried, bunkered, and subterranean vaulted tanks as aboveground tanks.)*

AREA. Any building or group of buildings, structures, or equipment which perform the same function or service, at the same location and under the same supervision.

AUTOMATIC FLOW RESTRICTOR. An overfill prevention device inside a tank's fill tube to restrict (but not shut off) flow into the tank either 30 minutes prior to overfill or when the tank is no more than 90% full. (See 40 CFR 280.20(c)(1)(ii).)

AUTOMATIC FLOW SHUT-OFF. An overfill prevention device consisting of a valve (mechanical float or electronic solenoid) inside a tank's fill tube to shut off flow into the tank when the tank is no more than 95% full. The valve MUST be rated for pressurized delivery, and there MUST be a tight-fit connection with the delivery truck. (See 40 CFR 280.20(c)(1)(ii).)

DESIGNATED PERSON. The person designated to be responsible for oil spill prevention at a SPCC facility.. This must be a person who reports to line management (40 CFR 112.7(e)(10)(ii).)

DISCHARGE. Includes, but is not limited to, any spilling, leaking, pumping, pouring, emitting, emptying, or dumping of oil according to 40 CFR 110.

ENVIRONMENT. The navigable waters, waters of the contiguous zone, and any other surface water, ground water, drinking water supply, land surface and subsurface strata, or ambient air under jurisdiction of the United States.

FACILITY. The limits fenceline to fenceline of a Naval Installation.

GOOD ENGINEERING PRACTICE. Consideration of currently applicable codes and standards (e.g., STI, UL, API, ASTM, NFPA, ASME, NACE, ACI, and ANSI), and regulations (e.g., OSHA, USCG, and FEMA) in evaluating the facility and writing the plan; every aspect of an oil storage facility (e.g., construction, operation, maintenance, inspection, and testing) must conform to recognized industry norms.

(Note: while this term generically forces consideration of industry codes, standards and practices, it also allows the use of judgment in applying them.)

HARMFUL QUANTITIES. For all practical purposes, any amount that causes a sheen on the water or adjoining shorelines or cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines or otherwise violate water quality standards. (See 40 CFR 110.)

HAZARDOUS MATERIAL. Any material which, because of its quantity, concentration, or physical, chemical, or infectious characteristics, may pose a substantial hazard to human health or to the environment. Usually does not refer to hazardous waste.

HAZARDOUS SUBSTANCE. Hazardous materials or hazardous waste designated as hazardous under section 101(14) of CERCLA. A comprehensive list of CERCLA regulated HS has been published by EPA in 40 CFR 302.

HAZARDOUS WASTE. Any solid, liquid, semisolid, or contained gaseous material designated as waste for disposal and listed in the Identification and Listing of Hazardous Waste of 40 CFR 261 or state hazardous material control authority.

HIGH LEVEL ALARM. An overfill prevention device that alerts the operator either one minute before overfill or when the tank is no more than 90% full. (See 40 CFR 280.20(c)(1)(ii).)

NAVAL FACILITIES. Aircraft, vessels, buildings, structures, equipment, vehicles, and property owned by, constructed or manufactured for lease to the Department of the Navy.

NAVIGABLE WATERS. For all practical purposes, any body of water (e.g., ocean, lake, river, stream, slough, pond, mudflat) or its tributaries or adjacent wetlands. (40 CFR 112.2)

OIL. A catch-all term primarily for petroleum and its refined products (e.g., gasoline, diesel, jet fuel, and lube oils), but also for vegetable oil, mineral oil, sludge, and oil mixed with any wastes except dredge spoils. (See 40 CFR 112.2 for the regulatory definition.)

QUALIFIED INDIVIDUAL. Individual having full authority, including contracting authority, to implement spill removal actions. (See 40 CFR 112.20(h)(1))

RELEASE. Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing of hazardous substances into the environment.

REPORTABLE SPILLS. Spills of harmful quantities of either oil or hazardous substances into or upon the navigable waters of the U.S. or its adjoining shorelines. (See CWA 311(b))

SPILL. Any accidental or unpermitted discharge of oil or HS into or upon surrounding water or land.

STORAGE CAPACITY. The size of a tank (as opposed to how much it might currently be holding).

UNDERGROUND STORAGE TANK. A tank including underground piping connected to the tank that has at least 10 percent of its volume underground. *(Note: for purposes of the SPCC regulations, only USTs storing either petroleum or certain hazardous chemicals are included in this definition)*

APPENDIX B

OPERATIONAL REQUIREMENTS OF SPCC RULE

OPERATIONAL REQUIREMENTS OF SPCC RULE

GENERAL:

- DESIGNATED PERSON who reports to line management should be designated for each facility to be accountable for oil spill prevention. *[112.7(e)(10)(ii)]*
- GOOD ENGINEERING PRACTICE shall be conformed with (i.e., relevant industry standards and practices, such as API, ASTM, NFPA, UL, and ASME). *[112.7]*
- APPROPRIATE CONTAINMENT AND/OR DIVERSIONARY STRUCTURES OR EQUIPMENT including one or more of the following should be provided to prevent a spill from reaching navigable waters: dikes, berms, retaining walls, curbing, culverting, gutters, weirs, booms, diversion ponds, retention ponds, sorbent materials, other drainage system, or other barriers. *[112.7(c)]*
  (Note: if providing such structures is demonstrably impractical, certain measures including a strong oil spill contingency plan or a written commitment of manpower, equipment, and material required to expeditiously control and remove spilled oil, can be substituted; see 112.7(d).)
- APPROPRIATE CONTAINMENT OR DRAINAGE CONTROL STRUCTURES, specifically dikes, berms, and retaining walls, should be sufficiently impervious to oil. *[112.7(c)]*

INSPECTIONS AND TESTS:

- INSPECTIONS should be performed on:
  - ACCUMULATED RAINWATER IN DIKED AREAS of bulk storage tanks (if drainage is directly to storm drains or navigable waters) (before draining). *[112.7(e)(2)(iii)]*
  - AST SUPPORTS/FOUNDATIONS (at time of integrity testing). *[112.7(e)(2)(vi)]*
- EXAMINATIONS should be performed on:
  - BURIED PIPING (when exposed for any reason) *[112.7(e)(3)(i)]*
  - ABOVEGROUND VALVES AND PIPELINES (regular) *[112.7(e)(3)(iv)]*
  - LOWER-MOST DRAIN AND ALL OUTLETS OF TANK TRUCKS AND CARS (before filling and before departure) *[112.7(e)(4)(iv)]*
- TESTS should (unless otherwise stated) be performed on/for:
  - LIQUID LEVEL SENSING DEVICES (regularly). *[112.7(e)(2)(viii)(E)]*
  - METALLIC UST PRESSURE TESTING (regularly). *[112.7(e)(2)(iv)]*
  - AST INTEGRITY (periodic). *[112.7(e)(2)(vi)]*
  - PIPING PRESSURE TESTING (may be warranted, periodic) *[112.7(e)(3)(iv)]*
- WRITTEN PROCEDURES developed for the facility should be used in performing inspections. *[112.7(e)(8)]*
- RECORDS of all inspections and procedures, signed by the appropriate supervisor or inspector, should be maintained for at least 3 years. *[112.7(e)(8)]*
- RECORDS AND WRITTEN PROCEDURES should be made part of the SPCC plan. *[112.7(e)(8)]*

SPILL PREVENTION TRAINING:

- SPILL PREVENTION INSTRUCTION on operation and maintenance of equipment, and in applicable pollution control laws, rules, and regulations, is the responsibility of the owner or operator. *[112.7(e)(10)(i)]*
- SPILL PREVENTION BRIEFINGS should be conducted for operating personnel at intervals frequent enough to assure understanding of the SPCC plan and to discuss recent spill events, equipment failures, malfunctioning components, and recently developed spill precautionary measures. *[112.7(e)(10)(iii)]*

SECURITY:

- FENCING should be used to completely surround oil handling, processing, and storage areas. *[112.7(e)(9)(i)]*
- ENTRANCE GATES should be locked and/or guarded when the facility is not in production or is unattended. *[112.7(e)(9)(i)]*
- MASTER FLOW AND DRAIN VALVES and any other valves that will permit direct outward flow of the tank's content to the surface should be securely locked in the closed position when in non-operating or non-standby status. *[112.7(e)(9)(ii)]*
- PUMP STARTER CONTROLS should be locked in the "off" position or located in an area accessible only to authorized personnel when the pumps are not in operating or standby status. *[112.7(e)(9)(iii)]*
- LOADING/UNLOADING CONNECTIONS OF OIL PIPELINES (and pipelines that are emptied of liquid content either by draining or by inert gas pressure) should be securely capped or blank-flanged when not in service or standby service for an extended time. *[112.7(e)(9)(iv)]*
- LIGHTING of oil handling and storage areas is should be appropriate for the type and location of the facility; consideration should be given to the need to discover spills after dark and to prevent vandalism that could result in spills. *[112.7(e)(9)(v)]*

LOADING/UNLOADING RACKS FOR TANK TRUCKS AND CARS:

- LOADING/UNLOADING PROCEDURES at racks should meet the minimum requirements and regulation established by the Department of Transportation. *[112.7(e)(4)(i)]*
- QUICK DRAINAGE SYSTEM, CATCHMENT BASIN, OR TREATMENT UNIT designed to handle spills should be used for any rack. *[112.7(e)(4)(ii)]*
- CONTAINMENT, whether quick drainage system, catchment basin, or treatment unit, should hold at least the capacity of the largest single compartment ever loaded/unloaded at the rack. *[112.7(e)(4)(ii)]*
- INTERLOCKED WARNING LIGHT/PHYSICOAL BARRIER/SIGNS should be provided to prevent departure from the rack before complete disconnection of transfer lines. *[112.7(e)(4)(iii)]*
- LOWER-MOST DRAIN and all outlets of tank trucks and cars should be closely examined at the rack for leakage before filling and before departure, and if necessary, repairs made to prevent leakage during transit. *[112.7(e)(4)(iv)]*

DRAINAGE FROM DIKED AREAS:

- VALVES OR OTHER POSITIVE MEANS should be used to restrain drainage from diked storage areas (unless the facility systems are designed to handle leakage). *[112.7(e)(1)(i)]*
- PUMPS OR EJECTORS, if used to drain diked areas, should be manually activated and the accumulation should be examined before starting. *[112.7(e)(1)(i)]*
- FLAPPER-TYPE DRAIN VALVES should NOT be used to drain diked areas. *[112.7(e)(1)(ii)]*
- MANUAL, OPEN-AND-CLOSED VALVES should be used to drain diked areas whenever practical. *[112.7(e)(1)(ii)]*
- INSPECTION OF RETAINED STORM WATER should be performed if facility drainage drains directly to water courses and not into wastewater treatment plants. *[112.7(e)(1)(ii)]*
- DRAINAGE DIVERSION SYSTEM meeting the following criteria should be provided if facility drainage isn't engineered to meet all the requirements for diked or undiked areas: 1) located at the final discharge point of facility drainage (i.e., where it leaves the facility's drainage system), and 2) return oil to the facility in the event of an uncontrolled spill. *[112.7(e)(1)(iv)]*
- DRAINAGE TO STORM DRAINS OR NAVIGABLE WATERS from diked areas may be acceptable if: 1) the bypass valve is normally sealed closed, 2) the storm water is inspected before draining, 3) the bypass valve is opened and sealed after draining under responsible supervision, and 4) adequate records are kept of drainings. *[112.7(e)(2)(iii)]*

DRAINAGE FROM UNDIKED AREAS:

- PONDS, LAGOONS, OR CATCHMENT BASINS should, if possible, be provided to retain spills or return oil to the facility from undiked areas. *[112.7(e)(1)(iii)]*
- CATCHMENT BASINS for retaining spills from undiked areas are should be in areas not subject to periodic flooding. *[112..7(e)(1)(iii)]*

- DRAINAGE DIVERSION SYSTEM meeting the following criteria should be provided if facility drainage isn't engineered to meet all the requirements for diked or undiked areas: 1) located at the final discharge point of facility drainage (i.e., where it leaves the facility's drainage system), and 2) returns oil to the facility in the event of an uncontrolled spill. *[112.7(e)(1)(iv)]*

TREATMENT UNITS FOR DRAINAGE WATERS:
- GRAVITY FLOW should be used for multiple-unit treatment systems. *[112.7(e)(1)(v)]*
- TWO LIFT PUMPS should be provided if gravity flow isn't used at multiple-unit treatment systems, and at least one should be permanently installed if treatment is continuous. *[112.7(e)(1)(v)]*
- FAIL-SAFE ENGINEERING should have been engineered into all facility drainage systems to prevent oil from reaching navigable waters in the event of equipment failure or human error. *[112.7(e)(1)(v)]*
- DISPOSAL FACILITIES for plant effluents which are discharged to navigable waters should be observed frequently enough to detect system upsets that could result in a spill. *[112.7(e)(2)(ix)]*

ALL TANKS:
- FLOW AND DRAIN VALVES and any other valves that could allow a tank to discharge to the surface should be locked closed unless they are in operating or standby status. *[112.7(e)(9)(ii)]*
- TANK MATERIAL AND CONSTRUCTION should be compatible with the oil stored and conditions of storage (temperature, pressure, etc.). *[112.7(e)(2)(i)]*
- SECONDARY CONTAINMENT (being dikes, containment curbs, culverting, pits, drainage trench to a holding pond, etc.) should be provided for all tank installations and be: 1) sufficiently impervious to contain a spill, and 2) sufficiently large to hold the capacity of the largest single tank plus sufficient freeboard to allow for precipitation. *[112.7(e)(2)(ii)]*
- FAIL-SAFE ENGINEERING should, as far as is practical, be utilized on tanks. *[112.7(e)(2)(viii)]*
- OVERFILL PROTECTION should be provided for tanks, such as one or more of the following: 1) high liquid level alarms with audible or visual signal at a constantly manned operation or surveillance station (larger operations), 2) audible air vent (smaller operations), 3) automatic high liquid level pump cutoff (larger, more complex operations), 4) direct audible or code signal communication between the tank gauger and the pumping station, 5) 'automatic' liquid level sensing (visible gauges, computers, telepulse, etc.). *[112.7(e)(2)(viii)]*
- LIQUID LEVEL SENSING DEVICES used in overfill protection should be regularly tested. *[112.7(e)(2)(viii)]*

ABOVEGROUND TANKS:
- INTEGRITY TESTING of ASTs should be performed periodically, and comparison records kept where appropriate. *[112.7(e)(2)(vi)]*
- SUPPORTS/FOUNDATIONS of ASTs should be inspected in conjunction with integrity testing. *[112.7(e)(2)(vi)]*
- TANK EXTERIORS AND DIKED AREAS should be observed frequently by operating personnel to detect leaks, deterioration, and accumulation of oil in diked areas. *[112.7(e)(2)(vi)]*
- VISIBLE LEAKS that result in oil loss from tank seams, gaskets, rivets and bolts large enough to cause accumulation in diked areas should be promptly corrected. *[112.7(e)(2)(x)]*
- PARTIALLY BURIED metallic tanks should be avoided, unless the tank has adequate coating to prevent corrosion. *[112.7(e)(2)(v)]*

UNDERGROUND TANKS:
- REGULAR PRESSURE TESTING is should be performed for all metallic USTs. *[112.7(e)(2)(iv)]*
- CATHODIC PROTECTION, COATING, or other effective corrosion protection methods compatible with local soil conditions should protect all new metallic USTs. *[112.7(e)(2)(iv)]*

MOBILE/PORTABLE TANKS:
- LOCATION/POSITIONING should minimize the possibility of spills reaching navigable waters. *[112.7(e)(2)(xi)]*
- SECONDARY CONTAINMENT (dikes, catchment basins, etc.) sufficient to hold the largest single tank or compartment should be used. *[112.7(e)(2)(xi)]*

- LOCATING OUTSIDE OF FLOOD-PRONE AREAS should be done. *[112.7(e)(2)(xi)]*

TANKS HEATED BY INTERNAL COILS:

- STEAM RETURN OR EXHAUST LINES from internal heating coils which discharge to navigable waters should be monitored for contamination or be passed through a separation or retention system. *[112.7(e)(2)(vii)]*
- REPLACEMENT OF INTERNAL COILS with external heating should be considered. *[112.7(e)(2)(vii)]*

ALL PIPING:

- EXPOSED PIPE CORRIDORS OR GALLERIES is recommended wherever possible. *[112.7(e)(3)(i)]*
- TERMINAL CONNECTIONS at transfer points should be capped or blank-flanged and marked as to origin when a pipeline is not in service or when on standby for an extended time. *[112.7(e)(3)(ii)]*
- PIPING LOADING/UNLOADING CONNECTIONS AND DRAINS should be capped or blank-flanged when not in service or when on standby for an extended time. *[112.7(e)(9)(iv)]*
- PRESSURE TESTING may be warranted periodically for areas where drainage is such that a failure would lead to a spill event. *[112.7(e)(3)(iv)]*

ABOVEGROUND PIPING:

- PIPE SUPPORTS should be designed to minimize abrasion and corrosion and to allow for expansion and contraction. *[112.7(e)(3)(iii)]*
- REGULAR EXAMINATION by operating personnel should be performed on aboveground piping, valves, and appurtenances. *[112.7(e)(3)(iv)]*
- VEHICULAR TRAFFIC should be warned verbally or by signs to ensure aboveground piping is not endangered. *[112.7(e)(3)(v)]*

BURIED PIPING:

- PROTECTIVE WRAPPING, COATING, AND CATHODIC PROTECTION should all be provided if soil conditions warrant. *[112.7(e)(3)(i)]*
- EXAMINATION OF EXPOSED PIPING for deterioration should be performed whenever buried piping is exposed for any reason. *[112.7(e)(3)(i)]*
- CORROSION DAMAGE should receive additional examination and corrective action when found during examination of exposed buried piping. *[112.7(e)(3)(i)]*

APPENDIX C
DATA COLLECTION WORKSHEETS

FACILITY INFORMATION COLLECTION SHEET

FACILITY:

GENERAL INFORMATION:

TOPIC	INFORMATION/DISCUSSION
ALTERNATE NAMES (old, unofficial, etc.)	
OPERATOR (dept, command, tenant, etc.)	
COMPLIANCE OBLIGATION (mandatory or optional)	
POSITION OF DESIGNATED PERSON (if compliance is mandatory)	
WHAT FACILITY DOES (brief description)	
PHYSICAL PLANT (brief description)	
LOCATION WITHIN HOST INSTALLATION (enough information to find it on a map)	

SECURITY AT FACILITY:

SECURITY MEASURE	DISCUSSION
FENCING (of facility or tanks)	
GATES (of facility or tank fencing)	
SECURITY PATROLS (other than usual installation patrols)	
OTHER:	

UNDIKED AREA DRAINAGE:

TYPE AREA	DESCRIPTION OF HOW DRAINAGE IS CONTAINED/CONTROLLED
DRUM STORAGE	
PARKING	
OTHER:	

DRAINAGE WATER TREATMENT UNITS:

TOPIC	DISCUSSION
TYPE(S)	
FLOW BETWEEN TREATMENT UNITS (if multiple units; gravity or pumps)	
NUMBER OF LIFT PUMPS (if multiple units)	
FREQUENCY OF OPERATION (continuous or intermittent)	
INSTALLATION (permanent or temporary)	
FAIL-SAFE PROVISIONS (to prevent discharge due to equipment/operator failure)	
OTHER:	

FLOODING PROVISIONS:

TYPE AREA	DISCUSSION OF PROVISIONS
RETENTION PONDS AND BASINS	
MOBILE TANKS	
HW STORAGE AREAS	
OTHER:	

TANK DATA COLLECTION SHEET FOR ASTs, MOBIL TANKS, AND TRANSFORMERS

AREA:

Tank Site (Building #):

Installation Map Grid #:

Number of Tanks in Set

Capacity (gal):

Material Stored:

Tank Manufacturer:

Model:

Year Installed:

TYPE OF SPCC-REGULATED TANK
- ☐ **PARTIALLY BURIED (TOP EXPOSED)**
- ☐ **PARTIALLY BURIED (BUNKERED)**
- ☐ AST
- ☐ Mobil Tank
- ☐ Transformer
- ☐ Pressure Tank
- ☐ Other: ____________

CONDITION:
- ☐ **UNACCEPTABLE**
- ☐ New
- ☐ Excellent
- ☐ Good
- ☐ Other: ____________

CURRENT USE (check all that apply)
- ☐ Long-term storage
- ☐ Temporary storage
- ☐ Seasonal storage
- ☐ Furnace
- ☐ Boiler
- ☐ Generator
- ☐ Emergency generator
- ☐ Transformer
- ☐ Vehicle fueling
- ☐ Permanently closed
- ☐ Other: ____________

COLOR PAINTED
- ☐ None (rusting)
- ☐ Yellow
- ☐ Red
- ☐ Black
- ☐ White
- ☐ Beige
- ☐ Gray
- ☐ Blue
- ☐ Silver
- ☐ Other: ____________

DIMENSIONS

	Diameter (D)	
or	Circumference (C)	
	Length (L)	
	Height (H)	
	Width (W)	

MARKINGS FOR MATERIALS STORED:
- ☐ **NONE**
- ☐ **WRONG**
- ☐ **INADEQUATE**
- ☐ Acceptable
- ☐ Other: ____________

CALCULATED VOLUME ____________ GAL

horizontal cylinder = ($5.875 \times L \times D^2$)
vertical cylinder = ($.5953 \times H \times C^2$ or $5.875 \times H \times D^2$)
box = ($7.48 \times L \times W \times H$)
(volumes in gallons calculated from lengths in feet)

LEAK DETECTION
- ☐ Interstitial Monitoring
- ☐ Vapor Monitoring
- ☐ Groundwater Monitoring
- ☐ Automatic Tank Gauging
- ☐ Other: ____________

CONSTRUCTION MATERIAL
- ☐ **INCOMPATIBLE WITH CONTENTS**
- ☐ Welded steel
- ☐ Riveted steel
- ☐ Fiberglass or fiberglass reinforced plastic
- ☐ Other: ____________

SHAPE
- ☐ Horizontal cylinder
- ☐ Horizontal cylinder w/dike
- ☐ Horizontal cylinder w/dbl.-wall
- ☐ Vertical cylinder
- ☐ Other: ____________

SUPPORT (HORIZONTAL AST):
- ☐ Concrete saddles (unpadded)
- ☐ Concrete saddles (padded)
- ☐ Steel frame with saddles
- ☐ Steel frame welded to tank
- ☐ Steel skid with saddles
- ☐ Steel skid welded to tank
- ☐ Built-in rectangular dike
- ☐ Other: ____________

CORROSION PROTECTION
- ☐ None (existing buried tank)
- ☐ N/A (non-corroding tank)
- ☐ Coating
- ☐ Cathodic protection ____________
- ☐ Other: ____________

TANK DATA COLLECTION SHEET FOR ASTs, MOBIL TANKS, AND TRANSFORMERS

SUPPORT (VERTICAL AST):
- ☐ **Concrete foundation (visible)**
- ☐ **Concrete foundation (not visible)**
- ☐ Other: ____________

SUPPORT SEISMIC/WIND ADEQUACY
- ☐ **SUPPORT UNSTABLE**
- ☐ **TANK UNSTABLE ON SUPPORT**
- ☐ Adequate
- ☐ Other: ____________

SECONDARY CONTAINMENT TYPE
- ☐ **NONE**
- ☐ **INSUFFICIENT CAPACITY**
- ☐ **NOT IMPERVIOUS**
- ☐ Built-in Rectangular dike
- ☐ Double-walled tank
- ☐ Earthen dike
- ☐ Gravel dike
- ☐ Concrete walls
- ☐ Cement block walls
- ☐ Curbing
- ☐ Trenching
- ☐ Vault
- ☐ Other: ____________

SECONDARY CONTAINMENT LINING
- ☐ None
- ☐ N/A (built-in containment)
- ☐ Polyethylene
- ☐ High-density polyethylene (HDPE)
- ☐ Neoprene
- ☐ Asphalt
- ☐ Other: ____________

SECONDARY CONTAINMENT DIMENSIONS

Diameter (D)	
Length (L)	
Height (H)	
Width (W)	

CALC VOLUME [____________ GAL]

(rectangular dike = (7.48 x L x W x H)

(double-walled cylinder = (5.875 x L x D^2)

(volume in gallons calculated from lengths in feet)

DIKE DRAINAGE MECHANISM
- ☐ **NOT POSITIVELY CONTROLLED**
- ☐ **FLAPPER-TYPE VALVE**
- ☐ **AUTOMATICALLY ACTIVATED PUMP**
- ☐ Manual open and close valve
- ☐ Manually-activated pump
- ☐ Plugged/capped outlet
- ☐ None (no outlet)
- ☐ Other: ____________

DIKE DRAINAGE OUTFALL
- ☐ None
- ☐ Ground outside dike
- ☐ Sanitary sewer
- ☐ Storm sewer (to navigable waters)
- ☐ Storm sewer (to treatment)
- ☐ Other: ____________

DIKE DRAINAGE VALVE LOCKING
- ☐ **CAN NOT BE LOCKED**
- ☐ **UNLOCKED**
- ☐ Locked
- ☐ Capped/plugged
- ☐ N/A (cap/plug; no valve)
- ☐ Other: ____________

OVERFILL PROTECT/FAIL SAFE ENGINEERING
- ☐ **NONE**
- ☐ **INADEQUATE**
- ☐ **NOT WORKING**
- ☐ Float indicator
- ☐ Dial Gauge
- ☐ Clock gauge
- ☐ Tape gauge
- ☐ Auto fill limiter
- ☐ Auto pump cut off
- ☐ High-level alarm
- ☐ Whistler (audible vent)
- ☐ Gauger/pumper visual contact
- ☐ Gauger/pumper radio contact
- ☐ Manometer
- ☐ Computer
- ☐ Telepulse
- ☐ Other: ____________

OVERFILL CATCHMENT
- ☐ None
- ☐ Catch pan at AST fill port
- ☐ Fill port inside secondary containment
- ☐ Internal chamber (dike tank)
- ☐ Other: ____________

TANK HEATING
- ☐ **INTERNAL SYSTEM SINGLE PASS W/DISCHARGE**
- ☐ **Internal system single pass w/treatment**
- ☐ Closed loop
- ☐ External system
- ☐ None
- ☐ Other: ____________

TANK MANIFOLDING
- ☐ Manifolded with tanks ____________
- ☐ Not manifolded

TANK DATA COLLECTION SHEET FOR ASTs, MOBIL TANKS, AND TRANSFORMERS CONTINUED

PIPING MATERIAL
- ☐ Steel
- ☐ Fiberglass reinforced plastic
- ☐ Copper
- ☐ Fuel hose
- ☐ N/A (no piping)
- ☐ Other: ______________

PIPING EXPOSURE
- ☐ **UNNECESSARILY UNDERGROUND**
- ☐ All aboveground
- ☐ As aboveground as practical
- ☐ None (no piping)
- ☐ Other: ______________

PIPING SUPPORT DESIGN
- ☐ **ALLOWS ABRASION/CORROSION**
- ☐ Minimizes abrasion/corrosion
- ☐ All within tank corrosion
- ☐ Special concrete trench
- ☐ N/A (no piping)
- ☐ Other: ______________

PIPING CORROSION PROTECTION
- ☐ None (existing buried pipe)
- ☐ N/A (no buried piping)
- ☐ N/A (non-corroding buried pipe)
- ☐ Coating
- ☐ Wrapping
- ☐ Cathodic protection
- ☐ Other: ______________

PIPING PROTECTION FROM VEHICLES
- ☐ **NONE**
- ☐ Posts
- ☐ Tank secondary containment
- ☐ Warning signs
- ☐ Verbal warnings to drivers
- ☐ N/A (no piping)
- ☐ Other: ______________

PIPING CONTAINMENT
- ☐ None
- ☐ Double-walled pipe
- ☐ All within tank containment
- ☐ Special concrete trench
- ☐ N/A (no piping)
- ☐ Other: ______________

VALVES-TO-SURFACE SECURITY
- ☐ **INADEQUATELY PROTECTED**
- ☐ All locked
- ☐ All capped/plugged
- ☐ Fenced facility
- ☐ N/A (no such valves)
- ☐ Other: ______________

PUMP STARTER CONTROL SECURITY
- ☐ **INADEQUATELY PROTECTED**
- ☐ N/A (consuming equipment draws fuel)
- ☐ Locked whenever "off"
- ☐ Unlocked, but valve locked
- ☐ In fenced facility
- ☐ Other: ______________

FIRE PROTECTION SYSTEM (tank)
- ☐ **NOT COMMENSURATE WITH TANK**
- ☐ None
- ☐ Automatic AFFF
- ☐ Manual AFFF
- ☐ Other: ______________

LIGHTING
- ☐ **NOT COMMENSURATE WITH FACILITY**
- ☐ None
- ☐ Light at tank
- ☐ General area lighting nearby
- ☐ Other: ______________

PROBABILITY OF REACHING NAVIGABLE WATERS
(ignoring secondary containment)
- ☐ Negligible (terrain retains)
- ☐ Low
- ☐ Medium
- ☐ High
- ☐ Very high (adjacent to navigable waters)
- ☐ Other: ______________

POTENTIAL FAILURES
(Fill in flow direction for each failure type)
- ☐ Overfill ______________
- ☐ Rupture ______________
- ☐ Leak ______________
- ☐ Fill hose spill ______________
- ☐ Other: ______________

TANK DATA COLLECTION SHEET FOR ASTs, MOBIL TANKS, AND TRANSFORMERS CONTINUED

INTEGRITY TEST SCHEDULE

INSPECTION SCHEDULE

MATERIAL SUPPLIER INFORMATION

Supplier:	
Truck pumping rate (gpm):	
Piping delivery rate (gpm):	

COMMENT ON ANY BOLD/CAPITALIZED ITEMS CHECKED
COMMENT:
COMMENT:
COMMENT:

TANK DATA COLLECTION SHEET FOR USTs AND OIL WATER SEPARATORS

AREA:

Tank Site (Building #):

Installation Map Grid #:

Number of Tanks in Set

Capacity (gal):

Material Stored:

Tank Manufacturer:

Model:

Year Installed:

TYPE OF SPCC-REGULATED TANK

- ☐ **PARTIALLY BURIED (TOP EXPOSED)**
- ☐ **PARTIALLY BURIED (BUNKERED)**
- ☐ UST (field constructed)
- ☐ UST (consumer heating oil)
- ☐ UST (aircraft hydrant system)
- ☐ UST (under 110 gallons)
- ☐ Pressure
- ☐ Other: ____________

CURRENT USE (check all that apply)

- ☐ Long-term storage
- ☐ Temporary storage
- ☐ Seasonal storage
- ☐ Furnace
- ☐ Boiler
- ☐ Generator
- ☐ Emergency generator
- ☐ Steam plant
- ☐ Vehicle fueling
- ☐ Permanently closed
- ☐ Other: ____________

CONDITION:

- ☐ **UNACCEPTABLE**
- ☐ New
- ☐ Excellent
- ☐ Good
- ☐ Other: ____________

CONSTRUCTION MATERIAL

- ☐ **INCOMPATIBLE WITH CONTENTS**
- ☐ Welded steel
- ☐ Riveted steel
- ☐ Fiberglass or fiberglass reinforced plastic
- ☐ Other: ____________

MARKINGS FOR MATERIALS STORED:

- ☐ **NONE**
- ☐ **WRONG**
- ☐ **INADEQUATE**
- ☐ Acceptable
- ☐ Other: ____________

SECONDARY CONTAINMENT TYPE

- ☐ **NONE**
- ☐ **INSUFFICIENT CAPACITY**
- ☐ **NOT IMPERVIOUS**
- ☐ Built-in Rectangular dike
- ☐ Double-walled tank
- ☐ Earthen dike
- ☐ Gravel dike
- ☐ Concrete walls
- ☐ Cement block walls
- ☐ Curbing
- ☐ Trenching
- ☐ Vault
- ☐ Other: ____________

SECONDARY CONTAINMENT LINING

- ☐ None
- ☐ N/A (built-in containment)
- ☐ Polyethylene
- ☐ High-density polyethylene (HDPE)
- ☐ Neoprene
- ☐ Asphalt
- ☐ Other: ____________

CORROSION PROTECTION

- ☐ **NONE (NEW METALLIC UST)**
- ☐ **NONE (ANY METALLIC PBST)**
- ☐ None (existing UST)
- ☐ Sacrificial anode
- ☐ Impressed current
- ☐ Exterior coating
- ☐ Other: ____________

LEAK DETECTION

- ☐ Interstitial Monitoring
- ☐ Vapor Monitoring
- ☐ Groundwater Monitoring
- ☐ Automatic Tank Gauging
- ☐ Other: ____________

TANK DATA COLLECTION SHEET FOR USTs AND OIL WATER SEPARATORS CONTINUED

OVERFILL PROTECT/FAIL SAFE ENGINEERING
- ☐ **NONE**
- ☐ **INADEQUATE**
- ☐ **NOT WORKING**
- ☐ Float indicator
- ☐ Dial Gauge
- ☐ Clock gauge
- ☐ Tape gauge
- ☐ Auto fill limiter
- ☐ Auto pump cut off
- ☐ High-level alarm
- ☐ Whistler (audible vent)
- ☐ Gauger/pumper visual contact
- ☐ Gauger/pumper radio contact
- ☐ Manometer
- ☐ Computer
- ☐ Telepulse
- ☐ Other: ____________

OVERFILL CATCHMENT
- ☐ None
- ☐ Catch pan at fill port
- ☐ Fill port inside secondary containment
- ☐ Internal chamber (dike tank)
- ☐ Other: ____________

TANK HEATING
- ☐ **INTERNAL SYSTEM SINGLE PASS W/DISCHARGE**
- ☐ **Internal system single pass w/treatment**
- ☐ Closed loop
- ☐ External system
- ☐ None
- ☐ Other: ____________

TANK MANIFOLDING
- ☐ Manifolded with tanks ____________
- ☐ Not manifolded

PIPING MATERIAL
- ☐ Steel
- ☐ Fiberglass reinforced plastic
- ☐ Copper
- ☐ Fuel hose
- ☐ N/A (no piping)
- ☐ Other: ____________

PIPING EXPOSURE
- ☐ **UNNECESSARILY UNDERGROUND**
- ☐ All aboveground
- ☐ As aboveground as practical
- ☐ None (no piping)
- ☐ Other: ____________

PIPING SUPPORT DESIGN
- ☐ **ALLOWS ABRASION/CORROSION**
- ☐ Minimizes abrasion/corrosion
- ☐ All within tank corrosion
- ☐ Special concrete trench
- ☐ N/A (no piping)
- ☐ Other: ____________

PIPING CORROSION PROTECTION
- ☐ None (no buried piping)
- ☐ None (existing buried pipe)
- ☐ N/A (non-corroding buried pipe)
- ☐ N/A (no piping)
- ☐ Coating
- ☐ Wrapping
- ☐ Cathodic protection
- ☐ Other: ____________

PIPING PROTECTION FROM VEHICLES
- ☐ **NONE**
- ☐ Posts
- ☐ Tank secondary containment
- ☐ Away from road
- ☐ Warning signs
- ☐ Verbal warnings to drivers
- ☐ N/A (no piping)
- ☐ Other: ____________

PIPING CONTAINMENT
- ☐ None
- ☐ Double-walled pipe
- ☐ All within tank containment
- ☐ Special concrete trench
- ☐ N/A (no piping)
- ☐ Other: ____________

VALVES-TO-SURFACE SECURITY
- ☐ **INADEQUATELY PROTECTED**
- ☐ All locked
- ☐ All capped/plugged
- ☐ Fenced facility
- ☐ N/A (no such valves)
- ☐ Other: ____________

PUMP STARTER CONTROL SECURITY
- ☐ **INADEQUATELY PROTECTED**
- ☐ N/A (consuming equipment draws fuel)
- ☐ Locked whenever "off"
- ☐ Unlocked, but valve locked
- ☐ In fenced facility
- ☐ Inaccessible to unauthorized persons
- ☐ Other: ____________

TANK DATA COLLECTION SHEET FOR USTs AND OIL WATER SEPARATORS CONTINUED

LIGHTING

- ☐ **NOT COMMENSURATE WITH FACILITY**
- ☐ None
- ☐ Light at tank
- ☐ General area lighting nearby
- ☐ Distant general area lighting
- ☐ Other: ____________________

PROBABILITY OF REACHING NAVIGABLE WATERS
(ignoring secondary containment)

- ☐ Negligible (terrain retains)
- ☐ Low
- ☐ Medium
- ☐ High
- ☐ Very high (adjacent to navigable waters)
- ☐ Other: ____________________

POTENTIAL FAILURES
(Fill in flow direction for each failure type)

- ☐ Overfill ____________________
- ☐ Rupture ____________________
- ☐ Leak ____________________
- ☐ Fill hose spill ____________________
- ☐ Other: ____________________

INTEGRITY TEST

MATERIAL SUPPLIER INFORMATION

Supplier:	
Truck pumping rate (gpm):	
Piping delivery rate (gpm):	

COMMENT ON ANY BOLD/CAPITALIZED ITEMS CHECKED
COMMENT:
COMMENT:
COMMENT:

DATA COLLECTION SHEET FOR TANKER TRUCK PARKING SITES

AREA:

Site (Building #):

Installation Map Grid #:

Material Transported:

Number of Parking Spaces

Capacity of largest single truck compartment (gal):

SECONDARY CONTAINMENT TYPE

- ☐ None
- ☐ Insufficient capacity
- ☐ Not impervious
- ☐ Earthen dike
- ☐ Gravel dike
- ☐ Concrete walls
- ☐ Cement block walls
- ☐ Curbing
- ☐ Trenching
- ☐ Other: ____________

SECONDARY CONTAINMENT LINING

- ☐ None
- ☐ N/A (built-in containment)
- ☐ Polyethylene
- ☐ High-density polyethylene (HDPE)
- ☐ Neoprene
- ☐ Asphalt
- ☐ Other: ____________

SECONDARY CONTAINMENT DIMENSIONS

Diameter (D)	
Length (L)	
Height (H)	
Width (W)	

CALC VOLUME [GAL]

(rectangular dike = (7.48 x L x W x H)

(double-walled cylinder = (5.875 x L x D^2)

(volume in gallons calculated from lengths in feet)

DIKE DRAINAGE MECHANISM

- ☐ **NOT POSITIVELY CONTROLLED**
- ☐ **FLAPPER-TYPE VALVE**
- ☐ **AUTOMATICALLY ACTIVATED PUMP**
- ☐ Manual open and close valve
- ☐ Manually-activated pump
- ☐ Plugged/capped outlet
- ☐ None (no outlet)
- ☐ Other: ____________

DIKE DRAINAGE OUTFALL

- ☐ None
- ☐ Ground outside dike
- ☐ Sanitary sewer
- ☐ Storm sewer (to navigable waters)
- ☐ Storm sewer (to treatment)
- ☐ Other: ____________

DIKE DRAINAGE VALVE LOCKING

- ☐ **CAN NOT BE LOCKED**
- ☐ **UNLOCKED**
- ☐ Locked
- ☐ Capped/plugged
- ☐ N/A (cap/plug; no valve)
- ☐ Other: ____________

STORMWATER RUN-ON CONTROLS

- ☐ None
- ☐ Dikes
- ☐ Trenches
- ☐ Other: ____________

STORMWATER RUN-OFF CONTROLS

- ☐ None
- ☐ Dikes
- ☐ Trenches
- ☐ Treatment unit: ____________
- ☐ Other: ____________

PROBABILITY OF REACHING NAVIGABLE WATERS
(ignoring secondary containment)

- ☐ Negligible (terrain retains)
- ☐ Low
- ☐ Medium
- ☐ High
- ☐ Very high (adjacent to navigable waters)
- ☐ Other: ____________

POTENTIAL FAILURES
(Fill in flow direction for each failure type)

- ☐ Leak ____________
- ☐ Rupture ____________
- ☐ Other: ____________

COMMENT ON ANY BOLD/CAPITALIZED ITEMS CHECKED
COMMENT:

DATA COLLECTION SHEET FOR TANKER TRUCK LOADING/UNLOADING SITES

AREA:

Tank Site (Building #):

Installation Map Grid #:

Number of Racks in Set

Capacity of largest single truck compartment (gal):

Material Transferred:

Year Installed:

Meets DOT Requirements:

CURRENT USE (check all that apply)
- ☐ Daily use
- ☐ Intermittent use
- ☐ Seasonal use
- ☐ Tank filling
- ☐ Tanker truck filling
- ☐ Vehicle fueling
- ☐ Permanently closed
- ☐ Other: ____________

SECURITY/INTERLOCKED DEVICES
- ☐ None
- ☐ Interlocked warning lights
- ☐ Physical barriers
- ☐ Signs
- ☐ Other: ____________

SECONDARY CONTAINMENT TYPE
- ☐ **NONE**
- ☐ **INSUFFICIENT CAPACITY**
- ☐ **NOT IMPERVIOUS**
- ☐ Built-in Rectangular dike
- ☐ Double-walled tank
- ☐ Earthen dike
- ☐ Gravel dike
- ☐ Concrete walls
- ☐ Cement block walls
- ☐ Curbing
- ☐ Trenching
- ☐ Vault
- ☐ Other: ____________

SECONDARY CONTAINMENT LINING
- ☐ None
- ☐ N/A (built-in containment)
- ☐ Polyethylene
- ☐ High-density polyethylene (HDPE)
- ☐ Neoprene
- ☐ Asphalt
- ☐ Other: ____________

SECONDARY CONTAINMENT DIMENSIONS

Diameter (D)	
Length (L)	
Height (H)	
Width (W)	

CALC VOLUME [GAL]
(rectangular dike = (7.48 x L x W x H)
(double-walled cylinder = (5.875 x L x D^2)
(volume in gallons calculated from lengths in feet)

DIKE DRAINAGE MECHANISM
- ☐ **NOT POSITIVELY CONTROLLED**
- ☐ **FLAPPER-TYPE VALVE**
- ☐ **AUTOMATICALLY ACTIVATED PUMP**
- ☐ Manual open and close valve
- ☐ Manually-activated pump
- ☐ Plugged/capped outlet
- ☐ None (no outlet)
- ☐ Other: ____________

DIKE DRAINAGE OUTFALL
- ☐ None
- ☐ Ground outside dike
- ☐ Sanitary sewer
- ☐ Storm sewer (to navigable waters)
- ☐ Storm sewer (to treatment)
- ☐ Other: ____________

DIKE DRAINAGE VALVE LOCKING
- ☐ **CAN NOT BE LOCKED**
- ☐ **UNLOCKED**
- ☐ Locked
- ☐ Capped/plugged
- ☐ N/A (cap/plug; no valve)
- ☐ Other: ____________

DATA COLLECTION SHEET FOR TANKER TRUCK LOADING/UNLOADING SITES
CONTINUED

PROBABILITY OF REACHING NAVIGABLE WATERS
(ignoring secondary containment)

- [ ] Negligible (terrain retains)
- [ ] Low
- [ ] Medium
- [ ] High
- [ ] Very high (adjacent to navigable waters)
- [ ] Other: ____________________

POTENTIAL FAILURES
(Fill in flow direction for each failure type)

- [ ] Overfill ____________________
- [ ] Rupture ____________________
- [ ] Leak ____________________
- [ ] Fill hose spill ____________________
- [ ] Other: ____________________

INSPECTION - LOWER MOST DRAINS AND OUTLETS

- [ ] **None**
- [ ] Written Procedure
- [ ] Form Used
- [ ] Other: ____________________

COMMENT ON ANY BOLD/CAPITALIZED ITEMS CHECKED
COMMENT:
COMMENT:
COMMENT:

DATA COLLECTION SHEET FOR HAZARDOUS WASTE/HAZARDOUS SUBSTANCE STORAGE SITES

AREA:

Building #:

Installation Map Grid #:

TYPE OF STORAGE FACILITY
- ☐ HW Site accumulation area
- ☐ HW 90 day storage area
- ☐ HW RCRA permitted storage/treatment facility
- ☐ HS storage area
- ☐ Other: ____________

NUMBER AND TYPES OF STORAGE UNITS
- ☐ Drums: ____________
- ☐ Flammable Storage Lockers: ____________
- ☐ Pallets: ____________
- ☐ Bays: ____________
- ☐ Walk in lockers: ____________
- ☐ Other: ____________

EXPOSURE/LOCATION
- ☐ Inside building
- ☐ Outside/exposed to elements
- ☐ Outside/under canopy
- ☐ Other: ____________

TYPES OF STORAGE UNITS	# OF UNITS	DIMENSIONS LxWxH (ft)	CONSTRUCTION MATERIAL	CORROSION PROTECTION	CONDITION
☐ Drums					
☐ Flammable Storage Lockers					
☐ Pallets					
☐ Bays					
☐ Walk in lockers					
☐ Other: ____________					

PROTECTION FROM VEHICLES
- ☐ None
- ☐ Posts
- ☐ Fenced Area
- ☐ Secured Area
- ☐ In Building
- ☐ Other: ____________

SUBSTRATE
- ☐ Dirt
- ☐ Asphalt
- ☐ Concrete
- ☐ Wood
- ☐ On Pallets
- ☐ Other: ____________

TYPES OF HAZARDOUS SUBSTANCES			QUANTITIES	MARKINGS
☐ POLs	☐ New	☐ Used		
☐ Paints	☐ New	☐ Used		
☐ Lube oils	☐ New	☐ Used		
☐ Hydraulic fluids	☐ New	☐ Used		
☐ Solvents	☐ New	☐ Used		
☐ Batteries	☐ New	☐ Used		
☐ Used oil	☐ New	☐ Used		
☐ Other: ______	☐ New	☐ Used		
☐ Other: ______	☐ New	☐ Used		
☐ Other: ______	☐ New	☐ Used		
☐ Other: ______	☐ New	☐ Used		
☐ Other: ______	☐ New	☐ Used		

SEPARATION OF INCOMPATIBLE MATERIALS
- ☐ Yes
- ☐ No
- ☐ N/A

ADEQUATE VENTILATION
- ☐ Yes
- ☐ No
- ☐ N/A

SUPPORT:
- ☐ Wood pallets
- ☐ Plastic pallets
- ☐ None
- ☐ Other: ____________

SUPPORT SEISMIC/WIND ADEQUACY
- ☐ **UNSTABLE**
- ☐ Secured/Anchored
- ☐ Adequate
- ☐ Other: ____________

TANK DATA COLLECTION SHEET FOR HAZARDOUS WASTE/HAZARDOUS SUBSTANCE STORAGE SITES CONTINUED

SECONDARY CONTAINMENT TYPE

- ☐ **NONE**
- ☐ **INSUFFICIENT CAPACITY**
- ☐ **NOT IMPERVIOUS**
- ☐ Concrete berm
- ☐ Asphalt berm
- ☐ Bottom of locker
- ☐ Containment pallet
- ☐ Other: ____________

SECONDARY CONTAINMENT LINING

- ☐ None
- ☐ N/A (built-in containment)
- ☐ Polyethylene
- ☐ High-density polyethylene (HDPE)
- ☐ Neoprene
- ☐ Asphalt
- ☐ Other: ____________

SECONDARY CONTAINMENT DIMENSIONS

Diameter (D)	
Length (L)	
Height (H)	
Width (W)	

CALC VOLUME [GAL]
(rectangular dike = (7.48 x L x W x H)
(double-walled cylinder = (5.875 x L x D^2)
(volume in gallons calculated from lengths in feet)

DIKE DRAINAGE MECHANISM

- ☐ **NOT POSITIVELY CONTROLLED**
- ☐ **FLAPPER-TYPE VALVE**
- ☐ **AUTOMATICALLY ACTIVATED PUMP**
- ☐ Manual open and close valve
- ☐ Manually-activated pump
- ☐ Plugged/capped outlet
- ☐ None (no outlet)
- ☐ Other: ____________

DIKE DRAINAGE OUTFALL

- ☐ None
- ☐ Ground outside dike
- ☐ Sanitary sewer
- ☐ Storm sewer (to navigable waters)
- ☐ Storm sewer (to treatment)
- ☐ Other: ____________

DIKE DRAINAGE VALVE LOCKING

- ☐ **CAN NOT BE LOCKED**
- ☐ **UNLOCKED**
- ☐ Locked
- ☐ Capped/plugged
- ☐ N/A (cap/plug; no valve)
- ☐ Other: ____________

TRANSFER PROCEDURE

- ☐ Truck
- ☐ Forklift
- ☐ Cart
- ☐ Hand
- ☐ Pipeline
- ☐ Other: ____________

PROXIMITY TO DRAINS/SOIL(ft) [ ]

INSPECTION SCHEDULE [ ]

SECURITY

- ☐ Lockable
- ☐ Fenced
- ☐ Lights inside
- ☐ Lights adjacent
- ☐ General area lighting
- ☐ Automatic fire sprinklers
- ☐ Fire extinguishers
- ☐ Fire hose

SAFETY EQUIPMENT

- ☐ Eye wash
- ☐ Shower
- ☐ Spill Kit
- ☐ MSDS available

PROBABILITY OF REACHING NAVIGABLE WATERS
(ignoring secondary containment)

- ☐ Negligible (terrain retains)
- ☐ Low
- ☐ Medium
- ☐ High
- ☐ Very high (adjacent to navigable waters)
- ☐ Other: ____________

POTENTIAL FAILURES
(Fill in flow direction for each failure type)

- ☐ Overfill ____________
- ☐ Rupture ____________
- ☐ Leak ____________
- ☐ Fill hose spill ____________
- ☐ Other: ____________

COMMENT ON ANY BOLD/CAPITALIZED ITEMS CHECKED
COMMENT:

DATA COLLECTION SHEET FOR PIPELINES

AREA:

Site (Building #):

Installation Map Grid #:

Pipeline ID:

Number of Pipelines in Set

Contents:

Year Installed:

Delivery Rate (gpm):

CONDITION:
- [ ] **UNACCEPTABLE**
- [ ] New
- [ ] Excellent
- [ ] Good
- [ ] Other: ________________

CURRENT USE (check all that apply)
- [ ] Continuous/daily use:
- [ ] Intermittent use
- [ ] Seasonal use
- [ ] Pressure
- [ ] Suction
- [ ] Gravity
- [ ] Permanently closed
- [ ] Other: ________________

COLOR PAINTED
- [ ] None (rusting)
- [ ] Black
- [ ] White
- [ ] Beige
- [ ] Gray
- [ ] Blue
- [ ] Silver
- [ ] Other: ________________

DIMENSIONS

Diameter (D)	
Length (L)	

MARKINGS FOR MATERIALS TRANSFERED:
- [ ] **NONE**
- [ ] **WRONG**
- [ ] **INADEQUATE**
- [ ] Acceptable
- [ ] Other: ________________

PIPING MATERIAL
- [ ] Steel
- [ ] Fiberglass reinforced plastic
- [ ] Fuel hose
- [ ] N/A (no piping)
- [ ] Other: ________________

PIPING EXPOSURE
- [ ] **UNNECESSARILY UNDERGROUND**
- [ ] All aboveground
- [ ] As aboveground as practical
- [ ] None (no piping)
- [ ] Other: ________________

PIPING SUPPORT DESIGN
- [ ] **ALLOWS ABRASION/CORROSION**
- [ ] Minimizes abrasion/corrosion
- [ ] All within tank corrosion
- [ ] Special concrete trench
- [ ] N/A (no piping)
- [ ] Other: ________________

PIPING CORROSION PROTECTION
- [ ] **NONE (existing buried metal pipe)**
- [ ] N/A (no buried piping)
- [ ] N/A (non-corroding buried pipe)
- [ ] Coating
- [ ] Cathodic protection: ________________
- [ ] Other: ________________

SUPPORT SEISMIC/WIND ADEQUACY
- [ ] **SUPPORT UNSTABLE**
- [ ] **PIPELINE UNSTABLE ON SUPPORT**
- [ ] Adequate
- [ ] Other: ________________

LEAK DETECTION
- [ ] Interstitial Monitoring
- [ ] Vapor Monitoring
- [ ] Groundwater Monitoring
- [ ] Automatic Tank Gauging
- [ ] Other: ________________

PIPING PROTECTION FROM VEHICLES
- [ ] **NONE**
- [ ] Posts
- [ ] Tank secondary containment

PUMP STARTER CONTROL SECURITY
- [ ] **INADEQUATELY PROTECTED**
- [ ] N/A (consuming equipment draws fuel)
- [ ] Locked whenever "off"

DATA COLLECTION SHEET FOR PIPELINES CONTINUED

- ☐ Warning signs
- ☐ Verbal warnings to drivers
- ☐ N/A (no piping)
- ☐ Other: ________

- ☐ Unlocked, but valve locked
- ☐ In fenced facility
- ☐ Other: ________

SECONDARY CONTAINMENT TYPE

- ☐ **NONE**
- ☐ **INSUFFICIENT CAPACITY**
- ☐ **NOT IMPERVIOUS**
- ☐ Double-walled pipe
- ☐ Special concrete trench
- ☐ Earthen dike
- ☐ Gravel dike
- ☐ Concrete walls
- ☐ Cement block walls
- ☐ Curbing
- ☐ Trenching
- ☐ Other: ________

SECONDARY CONTAINMENT LINING

- ☐ None
- ☐ N/A (built-in containment)
- ☐ Polyethylene
- ☐ High-density polyethylene (HDPE)
- ☐ Neoprene
- ☐ Asphalt
- ☐ Other: ________

SECONDARY CONTAINMENT DIMENSIONS

Diameter (D)	
Length (L)	
Height (H)	
Width (W)	

CALC VOLUME [GAL]

(rectangular dike = (7.48 x L x W x H)

(double-walled cylinder = (5.875 x L x D^2)

(volume in gallons calculated from lengths in feet)

DIKE DRAINAGE MECHANISM

- ☐ **NOT POSITIVELY CONTROLLED**
- ☐ **FLAPPER-TYPE VALVE**
- ☐ **AUTOMATICALLY ACTIVATED PUMP**
- ☐ Manual open and close valve
- ☐ Manually-activated pump
- ☐ Plugged/capped outlet
- ☐ None (no outlet)
- ☐ Other: ________

DIKE DRAINAGE OUTFALL

- ☐ None
- ☐ Ground outside dike
- ☐ Sanitary sewer
- ☐ Storm sewer (to navigable waters)
- ☐ Storm sewer (to treatment)
- ☐ Other: ________

DIKE DRAINAGE VALVE LOCKING

- ☐ **CAN NOT BE LOCKED**
- ☐ **UNLOCKED**
- ☐ Locked
- ☐ Capped/plugged
- ☐ N/A (cap/plug; no valve)
- ☐ Other: ________

PROBABILITY OF REACHING NAVIGABLE WATERS (ignoring secondary containment)

- ☐ Negligible (terrain retains)
- ☐ Low
- ☐ Medium
- ☐ High
- ☐ Very high (adjacent to navigable waters)
- ☐ Other: ________

POTENTIAL FAILURES (Fill in flow direction for each failure type)

- ☐ Leak ________
- ☐ Rupture ________
- ☐ Other: ________

INTEGRITY TEST SCHEDULE

[ ]

INSPECTION SCHEDULE

[ ]

COMMENT ON ANY BOLD/CAPITALIZED ITEMS CHECKED

COMMENT:

APPENDIX D
INSPECTION FORMS AND PROCEDURES

INSPECTION RECORD: RAIN WATER ACCUMULATION

PROCEDURE

1. Examine accumulation for floating product.
2. Examine accumulation for sheen on surface.
3. If evidence of oil is found, recover any product with vacuum truck (or other means), then remove any remaining sheen with sorbent pads.
4. If no evidence of oil or HS is found, or all oil removed, then drain containment.
5. Watch draining procedure to insure no oil or HS is drained
6. Close and seal drain valve.
7. Fill in inspection sheet with appropriate information

DATE	
INSPECTOR (name and organization)	

FACILITY	TANK OR SET INSPECTED	OK	OIL/ HS	OIL/HS REMOVED	WATER DRAINED	VALVE SEALED

COMMENTS ON ANY OIL OR HS FOUND:

TESTING RECORD: LIQUID LEVEL SENSING DEVICES

PROCEDURE

1. Examine device for visible defects (broken glass, stuck float/dial, etc.).
2. Note if level indicator moves freely and continuously during delivery.
3. Fill tank using visual or stick monitoring, then verify that device indicates full or slightly more (i.e., it is either correct or it reads high to prevent overfills).

DATE			
TESTER (name and organization)			
TANK OR SET TESTED	**OK**	**BAD**	**FACILITY, LOCATION, OR NUMBER**

COMMENTS ON ANY BAD (DEFECTIVE) DEVICES FOUND:

Drum And Small Container Storage And Handling Facility
Weekly Inspection Checklist

Facility:		Inspector:	

Item to Inspect	Acceptable	Unacceptable	Corrective Action
Storage/work areas are free of spills/ leaks			
Containers not leaking, rusted, deteriorated			
Containers have closed lids or bung holes			
Incompatible HS are not stored together			
Containers are stored off the floor/ground, in containment areas			
Drip pans are used under spigots and free of liquid			
Spigots, pumps, hoses, valves not leaking			
Containment areas are free of debris and liquid accumulations			
Containment/drainage structures are intact, no cracks, breaches			
Emergency equipment is operational, complete			
Storage/handling equipment is properly used, in good condition			
Clean/orderly areas, adequate aisle space			
Containers are labeled			

Inspector Signature		Date	
Supervisor Signature		Date	

Bulk Storage And Transfer Facility
Daily Inspection Checklist

Facility:		Inspector:	
Tank #:		Contents:	
Fill Level:			

Item To Inspect	Acceptable	Unacceptable	Corrective Action
Tank wall condition (not leaking)			
Fill valve is closed and locked			
Dike drain valve is closed and locked			
Valves condition (not leaking)			
Overfill control equipment functioning (before each product transfer operation)			
Inlet flow rate is sufficiently limited			
Pipes, hoses, fittings, connections not leaking			
Pipes, valves, hoses fittings, connections, not dented or damaged by traffic			
Evidence of leakage on the ground			
Adequate freeboard			
No debris found in containment area			

Inspector Signature		Date	
Supervisor Signature		Date	

Bulk Storage And Transfer Facility
Weekly Inspection Checklist

Facility:		Inspector:	
Tank #:		Contents:	

Item To Inspect	Acceptable	Unacceptable	Corrective Action
Roof vents clear			
Roof drains clear			
Liquid level gauging equipment operating properly			
Emergency shutoff valves operating properly			
Pressure relief devices unobstructed			
Grounding lines and connections not loose or corroded			
Fire extinguishing equipment in place, operates properly			
Containment dike intact (no cracks, holes or breaches)			
Containment dike does not require draining			
Oil/water separator or equivalent does not require pumping			
Oil/water separator discharge is clear			

Inspector Signature		Date	
Supervisor Signature		Date	

Bulk Storage And Transfer Facility
Monthly Inspection Checklist

Facility:		Inspector:	
Tank #:		Contents:	

Item To Inspect	Acceptable	Unacceptable	Corrective Action
Tank shell and roof not cracked/corroded, no structural damage			
Tank seams or welds not cracked, leaking or corroded			
Tank rivets/bolts not loose, missing or corroded			
Coating not bubbled, cracked or damaged			
Tank foundation not cracked, eroded or settled unevenly			
Tank supports/saddle not deteriorated or buckled			
Tank has not slipped from foundation or support			
Pipe supports not deteriorated/damaged, sagging or loose			
Piping, valves, fittings, couplings not leaking, corroded or damaged			
Cathodic protection system functioning properly			

Inspector Signature		Date	
Supervisor Signature		Date	

Annual Tank Internal Visual Inspection
(At scheduled down-time)

Facility:		Inspector:	
Tank #:		Contents:	

Item To Inspect	Acceptable	Unacceptable	Corrective Action
Condition of liner			
Condition of welds, seams			
Condition of tank walls			
Condition of tank bottom			
Observations:			

Inspector Signature		Date	
Supervisor Signature		Date	

Daily Facility Security Procedures

Facility:		Inspector:	

Check the following items prior to leaving the facility at the end of each working day:	**Check**
All entrance doors to the facility or building are closed and locked	
Master flow control valve, draw valve, and any other flow control valves in tanks are locked in the closed position	
Drainage valves from diked areas are locked in the closed position	
Starter controls on all chemical pumps are locked in the "off" position	
All access gates to fenced equipment and facilities are closed and locked (unless guarded continuously)	
All security lighting is operating and in good condition	
Warning signs are clearly visible and unobstructed	
Observations:	

Inspector Signature		Date	
Supervisor Signature		Date	

APPENDIX E
CHEMICAL COMPATIBILITY MATRIX

Appendix E
Chemical/ Material Compatibility Matrix

Chemical	Wood	Cement	Glass	Cast Iron	Carbon Steel	Stainless Steel 304	Stainless Steel 316	Aluminum	Nickel	Monel	Inconel	Hastelloy	Ceramic	Ceramagnet	Epoxy Resins	Phenolic Resins	PVC	EPDM	Polyethylene	Chlorinated Polyethylene	Ployropylene	Teflon	Neoprene	Hypalon	Buna-N	Natural Rubber
Cloroform	-	-	A	A	C	A	A	A	A	A	A	A	A	A	A	A	X	X	X	X	X	A	X	X	X	X
Chlorosulfonic Acid	-	-	A	X	-	-	C	C	A	A	A	A	-	-	X	X	A	-	-	-	-	-	X	-	-	-
Chromic Acid	X	X	A	X	-	X	X	X	X	X	-	-	A	-	X	X	A	-	C	-	-	-	X	-	-	-
Creosote	-	X	A	-	-	A	A	C	-	C	-	-	-	-	-	X	-	X	-	-	-	-	X	C	-	X
Cresol	-	X	A	A	-	A	A	A	A	A	-	-	-	-	-	X	X	-	X	-	-	-	X	-	-	-
Cyclohexane	-	-	A	A	C	-	-	A	-	A	-	-	-	-	-	X	A	X	X	A	A	-	X	X	A	X
Cyclohexanol	-	-	A	-	-	-	A	X	-	-	-	-	-	-	A	-	X	-	A	-	-	-	X	-	-	-
Cyclohexanone	-	-	A	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	X	-	-	-	X	-	-	-
Dichlorobenzene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	A	-	-	-	X	X	-	X
Diesel Oil	-	-	-	A	-	A	A	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diethylamine	-	-	-	-	-	A	A	C	A	A	A	-	A	-	-	-	X	-	-	-	-	-	X	-	-	-
Dimethyl Hydrazine	-	-	-	-	-	-	-	A	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-
Ether (Ethyl or Diethyl)	-	-	A	-	-	-	C	C	-	-	-	-	-	-	X	-	X	-	X	-	-	-	X	-	-	-
Ethyl Acetate	A	X	A	A	-	A	A	A	A	A	A	A	A	-	A	A	X	-	X	-	-	-	X	-	-	-
Ethyl Alcohol (Ethanol)	-	-	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	-	-	A	-	A	A	A	A
Ethyl Benzene	-	-	A	-	A	-	A	A	-	-	-	-	-	-	A	-	X	X	X	C	-	-	X	X	-	X
Ethyl Chloride	-	-	-	-	X	A	A	C	-	-	-	A	A	-	-	-	-	-	C	-	X	A	C	X	X	X
Ethyl Mercaptan	-	-	A	-	-	-	A	A	-	-	-	-	-	-	X	-	-	-	-	-	-	-	X	-	-	-
Ethylene	-	-	-	-	A	A	A	-	-	-	-	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylene Dichloride	-	-	A	-	X	A	A	C	A	A	C	A	A	-	A	A	X	C	X	C	A	A	X	X	X	X
Ethylene Oxide	-	-	-	-	X	A	A	A	-	-	-	A	A	-	-	-	-	-	-	-	-	A	-	-	X	-
Formaldehyde Solution	-	-	A	C	C	-	C	C	A	A	A	A	A	C	A	A	A	C	A	C	A	A	A	C	C	C
Formic Acid	-	-	A	X	-	A	A	C	A	A	X	A	A	-	A	C	A	-	A	-	-	-	A	-	-	-
Gasoline	-	-	A	A	-	A	A	A	A	A	A	A	A	-	A	A	C	-	X	-	-	-	X	-	-	-
Glycerin	-	X	A	A	-	A	A	A	A	A	A	A	A	-	-	A	A	-	A	-	-	-	C	-	-	-
Hydrazine	X	-	X	X	-	A	A	A	X	X	X	X	-	-	A	A	A	-	-	-	-	-	X	-	-	-
Hydrochloric Acid	-	-	A	X	X	X	X	X	X	X	A	X	A	X	A	X	A	-	A	C	A	A	X	A	C	A
Hydrofluoric Acid	-	X	X	X	X	X	X	X	X	A	-	A	X	-	A	A	A	-	A	C	-	A	X	A	X	A
Hydrogen	-	-	-	-	-	-	-	A	-	-	-	-	-	-	-	-	-	C	A	-	-	A	A	A	-	C
Hydrogen Cyanide	-	-	A	C	-	A	A	A	A	A	A	A	A	-	A	C	A	-	A	-	-	-	X	-	-	-
Hydrogen Peroxide	X	C	C	X	-	C	C	A	C	C	A	A	A	A	-	C	A	-	A	C	A	A	A	A	X	C
Hydrogen Sulfide	-	-	-	-	X	C	C	C	A	C	-	A	A	A	-	-	-	A	-	-	A	A	A	C	C	X
Isopropyl Alcohol (Isopropanol)	-	-	-	-	A	A	A	C	-	-	-	A	A	-	-	-	-	C	A	-	A	-	A	A	C	A
Kerosene	-	-	A	A	-	A	A	A	A	A	A	A	A	-	A	A	A	-	X	-	-	-	X	-	-	-
Mercury	-	-	-	-	C	A	A	C	-	-	-	C	A	-	-	-	-	A	A	-	A	A	C	A	A	C
Methane Gas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	A	-	-	-	A	C	-	X
Methyl Alcohol (Methanol)	A	A	A	A	A	A	A	C	A	A	A	A	A	A	A	A	A	A	A	C	A	A	A	A	A	A
Methyl Ethyl Ketone	-	A	A	-	A	A	A	A	-	-	-	-	-	-	X	A	X	A	X	-	A	A	X	X	X	C
Methyl Isobutyl Ketone	-	-	A	-	-	A	A	A	-	-	-	-	-	-	C	A	X	-	X	C	C	-	X	X	X	X
Methylene Chloride	-	-	-	-	C	A	A	A	-	-	-	A	A	-	-	-	-	-	-	C	X	A	-	-	X	-
Naphtha	-	-	A	A	-	A	A	A	A	A	A	A	A	-	A	A	C	-	A	-	-	-	X	-	-	-
Naphthalene	-	-	-	A	A	-	-	A	-	-	-	-	-	-	-	A	X	X	X	-	C	A	X	X	X	X
Nitric Acid	X	X	A	X	-	C	C	C	X	X	X	X	A	C	X	X	X	-	X	X	X	A	X	X	X	X
Nitrobenzene	-	-	A	A	-	A	A	A	A	A	A	A	A	-	C	C	X	-	X	-	-	-	X	-	-	-
Nitropropanes	-	-	-	-	-	-	A	A	-	-	-	-	-	-	-	-	A	-	-	-	-	-	X	-	-	-
Oxalic Acid	-	A	A	X	-	C	C	C	A	A	A	A	A	-	A	-	A	-	A	-	-	-	A	-	-	-
Oxygen Gas	-	-	-	-	-	-	-	C	-	-	-	-	-	-	-	-	-	C	A	C	-	-	C	C	-	C
Parathion	-	-	-	-	-	A	A	A	-	-	-	-	-	-	A	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	-	-	-	-	-	A	A	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	C	-	-	X
Perchloric Acid	X	X	C	X	-	X	X	X	X	X	X	-	-	-	A	-	C	-	C	-	-	-	X	-	-	-
Petroleum Ether	-	-	A	A	-	A	A	A	A	A	A	A	A	-	A	A	C	-	A	-	-	-	X	-	-	-
Phenol	A	A	A	A	C	A	A	A	A	A	A	A	A	A	A	X	X	C	X	C	C	A	X	X	X	X
Picric Acid	-	-	A	X	-	A	A	X	X	X	X	A	A	-	-	X	X	-	A	-	-	-	X	-	-	-
Potassium Cyanide	-	A	C	C	-	A	A	A	A	A	A	A	A	-	A	X	A	-	A	-	-	-	A	-	-	-
Pyridine	A	A	A	A	-	A	A	A	-	-	-	-	A	-	-	A	X	-	A	-	-	-	X	-	-	-
Silver Nitrate	-	-	A	A	-	A	A	X	X	X	A	A	A	-	A	A	A	-	A	-	-	-	A	-	-	-

Chemical/ Material Compatibility Matrix (continued)

Chemical	Wood	Cement	Glass	Cast Iron	Carbon Steel	Stainless Steel 304	Stainless Steel 316	Aluminum	Nickel	Monel	Inconel	Hastelloy	Ceramic	Ceramagnet	Epoxy Resins	Phenolic Resins	PVC	EPDM	Polyethylene	Chlorinated Polyethylene	Ploypropylene	Teflon	Neoprene	Hypalon	Buna-N	Natural Rubber
Sodium	-	-	-	-	-	A	A	-	-	-	-	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium Carbonate	-	C	A	A	C	A	A	X	A	A	A	A	A	-	A	A	A	A	A	C	A	A	A	A	A	A
Sodium Chlorate	-	-	-	-	X	C	C	C	-	-	-	A	A	-	-	-	-	-	-	-	A	A	-	-	X	-
Sodium Chloride	A	A	A	C	X	C	C	C	A	A	C	A	A	A	A	A	A	A	A	C	A	A	A	A	A	A
Sodium Cyanide	A	A	C	A	C	A	A	X	X	X	X	-	A	-	A	A	A	C	A	-	A	A	A	A	A	A
Sodium Hydroxide	-	A	C	A	A	A	A	X	A	A	A	A	X	A	A	X	A	-	A	C	A	A	X	A	X	C
Sodium Hypochlorite	-	-	A	X	X	X	X	X	C	C	C	X	A	-	C	X	A	C	A	C	A	A	X	C	A	C
Sodium Nitrate	-	-	-	-	C	A	A	A	C	C	-	A	A	A	-	-	-	A	A	A	A	A	A	A	C	A
Sodium Sulfide	-	-	-	-	-	-	-	X	C	C	-	-	A	-	-	-	-	A	A	A	A	A	A	A	C	A
Stoddard Solvent	-	-	A	A	-	A	A	A	A	A	A	A	A	-	A	A	C	-	A	-	-	-	X	-	-	-
Styrene (Monomer)	-	-	A	-	-	-	C	A	-	-	-	-	-	-	-	X	X	X	X	C	-	A	X	-	X	X
Sulfur	-	-	-	-	-	A	A	-	-	-	-	A	-	-	-	-	-	C	X	-	-	-	C	C	-	C
Sulfur Dioxide	-	-	-	-	A	A	A	A	X	X	-	A	A	-	-	-	-	C	A	-	X	A	C	C	X	C
Sulfuric Acid	X	-	A	X	X	X	X	X	X	A	X	A	A	-	A	X	A	-	A	X	X	A	A	C	C	X
Tetrahydrofuran	-	-	-	-	-	-	A	-	-	-	-	-	A	-	X	-	X	-	X	-	-	-	X	-	-	-
Tetrachloroethane	-	-	A	-	-	-	A	X	-	-	-	-	-	-	A	-	X	-	-	-	-	-	X	-	-	-
Tetraethyl Lead	-	-	-	-	C	-	A	-	-	-	-	-	-	-	-	-	A	-	A	-	-	-	-	-	-	-
Toluene	C	C	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	X	X	C	X	A	X	X	X	X
Transformer Oil	-	-	A	-	-	-	A	A	-	-	-	-	-	-	A	A	X	-	-	-	-	-	A	-	-	-
Trichloroethane	-	-	-	-	-	-	-	C	-	-	-	-	A	-	-	-	-	X	A	C	-	A	X	X	X	X
Trichloroethylene	-	-	A	A	-	X	A	A	A	A	A	A	A	-	A	A	X	-	X	-	-	-	X	-	-	-
Turpentine	-	-	A	-	A	-	A	A	-	-	-	-	-	-	A	-	-	X	A	C	C	A	X	X	X	X
Vinyl Chloride	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	A	-	-	-	X	X	-	C
Xylenes	-	X	A	-	-	A	-	A	-	-	-	-	-	A	A	A	A	X	A	X	X	A	A	X	X	X

Key:

A = Acceptable

C = Conditionally acceptable

X = Unacceptable

- = Insufficient Information

APPENDIX F
STANDARD OPERATING PROCEDURES

Appendix F
Standard Operating Procedures

General Loading/Unloading Procedures

Ensure that tank car, tank truck, and vessel loading/unloading procedures meet the minimum requirements and regulations established by the Department of Transportation.

Load and unload tank vehicles in approved locations only. Verify that required spill containment structures surround loading and unloading areas.

Prior to material transfer, check to make sure that the loading /unloading vehicle and transfer lines are located within a containment system, or over a drain or on a sloped pavement that will drain to a containment system.

Prior to material transfer, inspect all storage tank flanges, joints, connections, and outlets for evidence of cracks and other sources of leakage. Tighten, adjust, or replace as necessary prior to any filling operation.

Prior to material transfer, visually check all hoses for leaks and wet spots.

Prior to material transfer, check the pumping circuit and verify the proper alignment of valves.

Verify that sufficient volume is available on the storage tank or truck to receive the product to be pumped.

Properly lock in the closed position all drainage valves in the secondary containment structure.

Secure the loading/unloading vehicle prior to transfer operations with physical barriers such as wheel chocks, warning signs, and interlocks to safeguard against accidental movement and rupture of transfer lines. Make sure that parking brakes on tank trucks or tank cars are set.

Establish adequate bonding/grounding of the tanker truck and receiving container before connecting to the fuel transfer point.

Keep hose ends tightly capped while moving hoses into position.

When loading, keep the internal and external valves on the receiving tank open along with the pressure relief valves.

When transferring Class 3 (flammable liquids) materials, shut off the vehicle engine unless it is used to operate a pump.

Make sure that communication is maintained with the pumping and receiving stations at all times.

During transfer operations, periodically inspect the condition of bonding/grounding.

Monitor all hose couplings during transfer operations.

Monitor the liquid level in the receiving tank during filling operations to prevent overflow.

Keep a log during the operation to record time and receiving tank soundings to ensure that all the product pumped is being transferred to the receiving tank and is not leaking at other points throughout the pumping circuit.

Monitor flow meters to determine rate of flow during loading and unloading operations.

Reduce flow rate while topping off the tank to provide sufficient reaction time for pump shutdown without overflow of the receiving tank.

Never completely fill the receiving tank when loading oils; provide a minimum of 1 percent ullage to prevent leakage due to thermal expansion.

Upon completion of transfer operations, close all tank and loading valves before disconnecting.

Upon completion of transfer operations, securely close all vehicle internal, external, and dome-cover valves before disconnecting.

Make sure that all material transfer operations are complete before disconnecting any transfer lines.

Secure all hatches.

After hatches have been secured, disconnect grounding/bonding wires.

Remove any wheel chocks that have been used.

Prior to vehicle departure, make sure that all connections, fill lines, and grounding/bonding wires are disconnected.

After the transfer lines are disconnected and prior to vehicle departure, inspect the outlets for evidence of leakage.

On completion of the transfer operation, make sure that the hoses or other connecting devices are drained, vented, blown down, or blown out with inert gas to remove the remaining oil before moving them away from their connections.

Use a drip pan when breaking a connection.

Cap the end of the hose or other connecting devices before moving them to prevent uncontrolled oil leakage.

Disconnect, drain, and support out-of-service or standby hoses to avoid crushing or excessive strain.

Cap associated hose risers.

Close all hose riser valves not in use.

Specific Tank Truck Procedures

In addition to the general procedures above, the following procedures also apply to tank truck loading and unloading:

Inspect the vehicle for defects prior to commencing a product flow. Typical areas warranting inspection on a truck are brake hoses, couplers, valves, wheels, and bearings, and all sections of the undercarriage. Closely examine the lowermost drain and all outlets of any tank truck for leakage or defects; if necessary, properly tighten, adjust, or replace to prevent liquid leakage while in transit.

Periodically inspect the condition of the alligator clips, especially the joint between the bonding wire and the clip, to ensure effective bonding circuits.

During the transfer of Class 3 (flammable liquids) materials, shut off motors of the tank truck when making and breaking hose connections. If loading or unloading is done without requiring the use of the motor of the tank truck to operate pumps, keep the motor shut off throughout the transfer operation of the liquid.

The driver, operator, or attendant of a tank truck should not remain in the vehicle, and should not leave the vehicle unattended during the loading or unloading process.

Specific Railroad Tank Car Loading/Unloading Procedures

In addition to the general procedures outlined above, the following also apply to railroad tank car transfer operations:

Inspect the tank car for defects prior to commencing a product flow. Typical areas warranting inspection on a tank car are air brake hoses, couplers, wheels and bearings, axles, cushioning units, center sills, body bolsters, center plate, and all sections of the undercarriage. Closely examine the lowermost drain and all outlets of any tank car for leakage or defects. If necessary, properly tighten, adjust, or replace to prevent liquid leakage while in transit.

The tank car must be attended by a qualified person during transfer operations.

Specific Ship/Shore Loading/Unloading Procedures

In addition to the general procedures outlined above, the following also apply to ship/shore transfer operations:

General Information.

During ship-to-shore oil transfers, no person may serve as the operations supervisor on more than one vessel at a time unless (1) the vessels are immediately adjacent, (2) there is ready means of access between vessels, and (3) the supervisor is someone other than the person in charge of the facility.

The National Maritime Service has developed a useful form (NMS Form 305) that allows the individual in charge of cargo transfer on the vessel and the counterpart on the dock to communicate and together attest that all critical items involved in cargo transfer have been checked and are in good order before actual transfer begins. This contact between the two key individuals in the cargo transfer operation assures good communication between the shore facility and the vessel. It also provides an opportunity to determine the loading rate and to identify any special problems, either ashore or afloat, which should be recognized before beginning the operation.

Operating Procedures.

Inspect all equipment aboard the tanker/ barge and on the loading dock prior to transfer line connection. Oil transfer hoses should not have any loose covers, kinks, bulges, soft spots, or any gouges, cuts, or slashes that penetrate the hose reinforcement.

Approve mooring lines and the method of mooring. Check and adjust these lines, as necessary, at half hour intervals.

Check and approve the ship's spill response equipment and cargo papers.

Check to make sure that communications required by 33 CFR 154.560 are operable for transfer operations.

Check to make sure that the emergency means of shutdown required by 33 CFR 154.550 and 155.780, as appropriate, are in position and operable.

Check to make sure that the designated personnel are on duty to-conduct the transfer operations in accordance with the facility operations manual and vessel oil transfer procedures.

Close or cover all drains in the discharge containment and On the pier in the vicinity of transfer operations while operations are in progress.

Deploy oil containment boom before any ship-to-shore transfer operations begin, and stop transfer operations immediately if a discharge of oil to the water occurs during the transfer. Notify immediate supervisor of any spill event. The Navy will issue a notification to the U.S. EPA and the Coast Guard.

Tightly close and seal (with a numbered seal which is logged in the ship's log book) all sea valves connected to the cargo piping, stern loading and discharge connections, and ballast discharge valves.

Be sure that lines and valves in the pump rooms and on the deck of the ship are checked by the ship's master or other responsible party to see that they are properly set for discharging cargo.

Blind flange or seal all hose and cargo risers not intended for use in the transfer. Close all air valves on headers.

On vessels, check each overboard discharge or sea suction valve that is connected to the vessel's oil transfer, ballast, or cargo tank system to ensure that it is sealed, lashed, or locked in the closed position before and after transfer operations.

Verify readiness for cargo discharge with the ship's captain and the shore-side personnel.

Authorize the start of pumping operations.

Frequently inspect the surrounding water during transfer operations for possible leakage or spillage.

Switch Loading.

In addition to the general procedures outlined above, the following also apply to switch loading operations:

Install special handling arm regulator tip that produces a minimum flow turbulence.

When switch loading low vapor pressure oil into a compartment which previously contained a high vapor pressure product, inject a sufficient quantity of inert gas into the vapor space prior to loading.

Allow at least 30 seconds relaxation time for oil flows between filter and loading tip.

Containment Area Draining Operations.

Drain the spill containment area periodically to remove accumulated rainwater to prevent loss of spill containment capacity. Also drain a containment area following a discharge. When draining the containment area, follow this procedure:

Prior to draining a containment area, check the water for oil sheen. If small amounts of oil are present, drain contaminated water to an oil-water separator or use sorbent mats.

If significant quantities of oil are present, alert supervisor and determine if a discharge has occurred.

Supervisor must determine whether to drain the material to oil-water separator or to pump out for recycling/ reclaiming.

Check exposed piping, hoses, and connections before draining.

Obtain supervisor's permission before draining the containment area.

Keep a log showing the time of opening and closing the drain valve, and the operator's signature verifying that the drain valve was locked after closing.

Tank Water Draining Procedures.

General Operating Procedures.

Monitor the tank draining operation constantly.

Make sure that the valves are piped into spill drainage systems leading to impoundments or containers.

Keep water drain valves locked in a closed position when not in service.

Pipe these valves into spill drainage systems leading to impoundments or containments.

Ensure that the opening and closing of the valves is done under strict authority.

Make frequent inspections of the valves to ensure that the security of the valves has not been violated in any way.

Other.

When draining water from a tank, follow these steps:

Close the outside valve and open the water drain valve (the inner and outer) to drain oil from the system into a portable container through the sampling valve.

When water appears at the sampling valve, partially open the outside valve and partially close the sampling valve.

Drain water until oil appears; then close the inner valve of the water drain valve and the outside valve; keep the outer valve of the water drain valve opened to drain the water from the valve and its piping through the sampling valve, until there is no more water.

Close the outer valve of the water drain valve and lock the water drain valve.

Close the sampling valve; make sure that all valves are closed.

APPENDIX G
SPILL CONTROL EQUIPMENT VENDORS

Appendix G
Spill Control Equipment Vendors

Spill Containment - Bulk Storage

Colloid Environmental Technologies Co.
Arlington Heights, IL
Phone: 847-392-5800

ModuTank Inc.
41-04 35th Ave.
Long Island City, NY 11101
Phone: 800-245-6964
FAX: 718-786-1008

Morton Polymer Systems
100 N. Riverside Plaza
Chicago, IL 60606-1598
Phone: 800-257-9596

MPC Containment Systems, LTD.
4834 S. Oakley
Chicago, IL 60609
Phone: 800-621-0146
FAX: 773-650-6028

Aero Tec Laboratories, Inc.
Spear Road Industrial Park
Ramsey, NJ 07446-1251
Phone: 800-526-5330
FAX: 201-825-1962

Spill Containment - Container Storage

Eagle Manufacturing Company
Wellsburg, WV 26070
Phone: 304-737-3171
FAX: 304-737-1752
http://www.ovnet.com/eagle

Environmental Container Corp.
Cornelius, OR
Phone: 800-729-7137

Justrite Manufacturing Company, L.L.C.
2454 Dempster Street
Des Plaines, IL 60016
Phone: 847-294-1000
FAX: 847-298-9716

P&D Solutions Corp.
7000 International Drive
Louisville, KY 40258
Phone: 800-216-7776
FAX: 502-933-1560

Precision Quincy
1625 N. Lake Shore Drive
Woodstock, IL 60098
Phone: 815-338-2675
FAX: 815-338-2960

Safety Storage, Inc.
2301 Bert Drive
Hollister, CA 95023
Phone: 408-637-5955
FAX: 408-637-7405
info@safetystorage.com

Spill Containment - Transfer Facilities

Syntechnics Inc.
700 Terrace Lane
Paducah, KY 42003
Phone: 502-898-7303
FAX: 502-898-7306

Sorbents

Safety-Kleen
1000 N. Randall Road.
Elgin, IL 60123
Phone: 800-323-5040
FAX: 847-468-8515

National Sorbents, Inc.
10139 Commerce Park Drive
Cincinnati, OH 45246
Phone: 513-860-4144
FAX: 513-860-5697
www.natl-sorbents.com

LeapFrog Technologies, Inc.
1408 11th Ave.
Altoona, PA 16601
Phone: 814-949-2600
FAX: 800-872-3764

Greenstuff Absorbent Products, Inc.
2020 Front Street
Suite 303
Cuyahoga Falls, OH 44221
Phone: 800-361-1598
FAX: 330-945-5149

APPENDIX H
SAMPLE SPCC PLAN

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1. CERTIFICATION

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER:

I am familiar with the requirements of the Code of Federal Regulations, Title 40, Part 112 (40 CFR 112). My judgments are based on my examination of each area included in this spill prevention, control and countermeasure plan and on information provided to me by Naval Air Station and the individual areas. This information is presumed correct.

This plan has been prepared in accordance with good engineering practice and with the requirements of the 40 CFR 112 (amended March 11, 1996). It is adequate for each area included. Adherence to the plan is the responsibility of Naval Air Station and the individual areas.

Required testing is complete.

Signature　　　　Date

Name of Professional Engineer, P.E.

Registered Professional Engineer

State Registration No. 12345

APPROVAL BY MANAGEMENT:

This plan has the full approval of Naval Air Station management at a level with authority to commit necessary resources.

______________________________ ______________________

Signature Date

Name of Commanding Officer

Rank, U.S. Navy

Commanding Officer

2. INTRODUCTION

2.1. PURPOSE

This is the master SPCC Plan for Naval Air Station in CA. It is a consolidation of the SPCC Plans of the areas on the contiguous property of the Naval Air Station. This plan was prepared by a person or persons familiar with the areas at this facility.

This plan is designed to meet or exceed the SPCC requirements of 40 CFR 112. State and local requirements are identified in Section 2.4. State and local requirements exceeding the requirements of 40 CFR 112 are provided in this plan except out-of-compliance issues presented in Section 5.

2.2. APPLICABILTY

2.2.1. Oil

40 CFR 112 requires that SPCC Plans be prepared for both onshore and offshore areas which could reasonably be expected to discharge oil in harmful quantities into navigable waters of the United States or adjoining shorelines (40 CFR 112.1). A SPCC Plan is required to be prepared for areas that have the following storage capacities:

(1) Underground storage tanks (USTs) with a capacity of more that 42,000 gallons of oil (40 CFR 112.1 (d)(2)(i)); or
(2) Total aboveground storage tank (AST) capacity of greater than 1,320 gallons of oil; (40 CFR 112.1 (d)(2)(ii)) or
(3) At least one AST with a capacity greater than 660 gallons (40 CFR 112.1 (d)(2)(ii)).

2.2.2. Hazardous Substances

SPCC Plans are not required by regulation for stored hazardous substances; however, hazardous substances are included in this plan as a best engineering practice.

2.3. STATE AND LOCAL REGULATIONS

This section identifies the requirements of state and local regulations and how they apply to the area. Table 2-1 shows a list of the related state and local regulatory requirements.

Table 2-1

Related State and Local Regulatory Burdens

REGULATION/LAW	TOPIC	ADDITIONAL REGULATORY BURDEN
California Health and Safety Code, Division 20, Chapter 6.67	Aboveground Storage Tanks	Daily Inspections of Tanks larger than 10,000 gallons. File storage statement every two years.
Comments: Applies to Tank T369		

2.4. REVIEWS

As required by 40 CFR 112.5(b), this plan has been reviewed, evaluated, and updated, as required, within the past three years.

A Registered Professional Engineer has signed and sealed the Master Copy of this plan. The Master Copy is kept in the office of the Environmental-Safety Officer, and its Review Record Section records all reviews, triennial or otherwise. The review record form is found in Table 2-2.

Table 2-2

Record of Reviews

DATE OF REVIEW	REVIEWER	REGISTRATION NUMBER	STATE OF REGISTRATION	COMMENT
8/15/97	John Smith	12345	CA	Everything seems to be in compliance. Nothing out of the ordinary.

2.5. AMENDMENTS

This SPCC Plan will be amended under the following circumstances:

- AFTER REPORTABLE SPILLS. 40 CFR 112.4 allows the Environmental Protection Agency (EPA) to require amendment in the event of:
  - a single spill event discharging more than 1,000 gallons of oil to navigable waters or adjoining shorelines; or
  - two spill events within any twelve months discharging enough oil to navigable waters to cause a sheen, form sludge, or violate water quality standards (40 CFR part 110);
- CHANGE IN AREA DESIGN, CONSTRUCTION, OPERATION, OR MAINTENANCE that materially affects the area's potential for the discharge of oil into or upon the navigable waters of the United States or adjoining shorelines. 40 CFR 112.5(a) requires amendment to the SPCC Plan and implementation of the amended SPCC Plan within six months after such change; and
- AFTER TRIENNIAL REVIEW the SPCC Plan will be amended within six months, if there is more effective field-proven prevention and control technology that will reduce the likelihood of a spill event from the area significantly.

The Registered Professional Engineer has signed and sealed the Master Copy of the plan. The Master Copy is kept in the office of the Environmental-Safety Officer, and its Amendment Record section is used to record all amendments.

As required by 40 CFR Part 112.5, this section records the amendments that reflect current changes in design, construction, operation, or maintenance that affect the area's potential for discharge. Table 2-3 lists the amendments to this SPCC Plan.

Table 2-3

Record of Amendments

AMEND. NO.	PAGE NO.	DATE.	P.E. NAME	P.E. SIGNATURE	STATE AND REG. NO.	DESCRIPTION OF CHANGE

2.6. ONGOING OR PLANNED SPCC PROJECTS

Table 2-4 lists the current projects and projects in the planning stage which address SPCC issues and concerns or impact SPCC issues. This includes all projects that improve or modify spill control structures. Also projects dealing with the construction and modification of storage areas are listed in this table.

Table 2-4

Ongoing or Planned Projects

PROJECT DESCRIPTION	IMPACT	COMPLETION DATE

2.7. PLAN ORGANIZATION

This SPCC Plan has been prepared for the areas located at and owned by Naval Air Station.

Section 1 provides space for the certifications that the document has been reviewed and approved.

Section 2 gives general information on the document including the purpose, applicability, governing regulations, and procedures for plan review and amendment.

Section 3 presents facility information. This information includes general facility information, facility drainage, the spill history of the areas on the facility, and a description of the areas located on the facility which are covered by this plan.

Section 4 presents a master list of the storage areas and equipment covered by this plan. Section 4 also identifies to which area each storage area belongs.

Section 5 presents detailed discussions for each storage area.
Appendix A provides the definitions and acronyms used in this SPCC Plan.
Appendix B contains the operational requirements of the SPCC rule.

Appendix C contains the data collection worksheets that were used to collect the area information, tank, pipeline, and other pertinent data.
Appendix C contains the hazardous waste/hazardous substance information collection sheets that were used to collect the information.
Appendix D contains samples of the inspection forms and the procedures used during testing and inspections.
Appendix E provides a copy of the inspection records for all tanks covered by this SPCC Plan.
Appendix F is the Tank Management Plan. This document is required by OPNAVINST 5090.1B.

2.8. PLAN DISTRIBUTION

A Master Copy of the SPCC Plan is kept in the office of the Environmental-Safety Officer. The master copy includes any records of revisions and amendments signed and sealed by a professional engineer, any written inspection procedures, records of inspections, and records of spills.

Areas attended at least 8 hours per day maintain a copy of this SPCC Plan on site. All areas forward copies of their records of inspections, spills, and changes in area structure to the office of the Environmental-Safety Officer. Areas that maintain a copy of the SPCC Plan maintain copies of their records of inspections, spills, and changes in area structure. Table 2-5 lists the locations where this document is maintained.

Table 2-5

Locations Where Document is Located

NAME OF DEPARTMENT	BUILDING NUMBER
Staff Civil Engineer (SCE)	
Naval Aviation Depot (NADEP)	
Public Works Center (PWC)	

3. HOST FACILITY INFORMATION

3.1. GENERAL INFORMATION

General information about the host facility is provided in Table 3-1. A listing of responsible authorities is provided in Table 3-2. A base grid map showing the locations of the areas is provided in Figure 3-1, and a topographic map of the facility is provided in Figure 3-2.

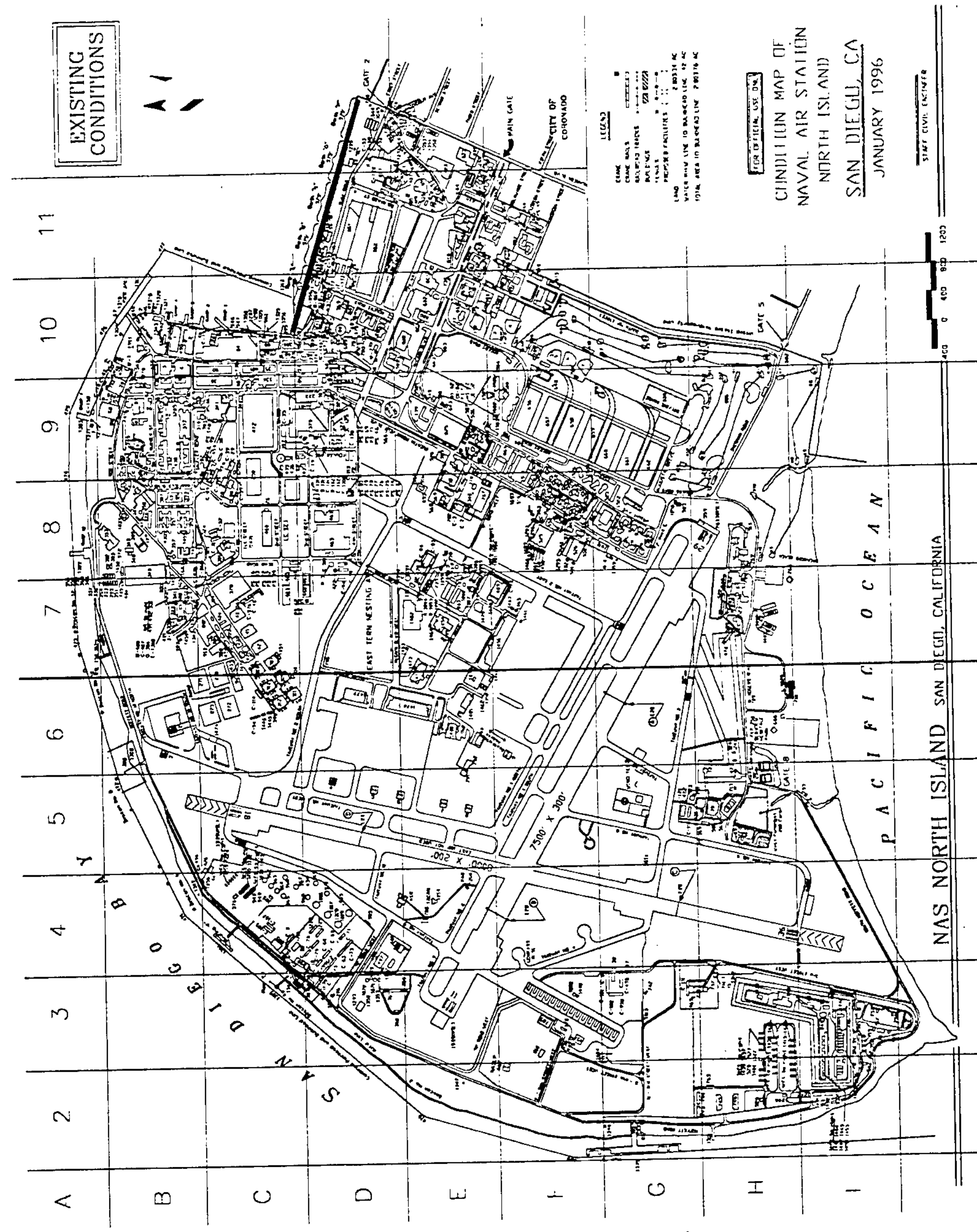
Table 3-1
Host Facility Information

FACILITY NAME		Naval Air Station
OWNER		U.S. Navy
TYPE OF FACILITY		Weapons Center
UNIFORM IDENTIFICATION CODE (UIC)		N00246
DESCRIPTION OF FACILITY		
DATE OF INITIAL FACILITY OPERATION		
ADDRESSES	MAILING	Commanding Officer NAS PO Box 357033 San Diego, CA 92135-7033
	PHYSICAL (if different)	
PHONE NUMBERS	24-HR	(619) 123-4567
	DAY	
	FAX	
COUNTY		San Diego
LATITUDE/LONGITUDE (degrees, minutes, seconds)	LAT: North	32.69N
	LONG: West	117.20W
"QUALIFIED INDIVIDUAL" (PRIMARY)	NAME	n/a
	POSITION	CDO Quarterdeck
	ADDRESS	as above
	WORK PHONE	
	24-HR PHONE	(619) 234-5678
"QUALIFIED INDIVIDUAL" (ALTERNATE)	NAME	Mr. Mike Mitchell
	POSITION	Alternate OPA's Qualified Individual
	ADDRESS	as above
	WORK PHONE	(619) 765-4321
	24-HR PHONE	(619) 456-7890

Table 3-2

Responsible Authorities

NATIONAL RESPONSE CENTER	800-424-8802
EPA REGION	EPA Region 9 (San Francisco, CA)
COAST GUARD DISTRICT	Coast Guard District 11 (San Diego, CA)
COAST GUARD CAPT. OF THE PORT	
NAVFAC EFD/EFA	EFD Southwest (San Diego, CA)



FILE: NASBASE.DWG

FIGURE 3-1 BASE MAP NAVAL AIR STATION SPCC PLAN	LOCATION OF NAVAL AIR STATION

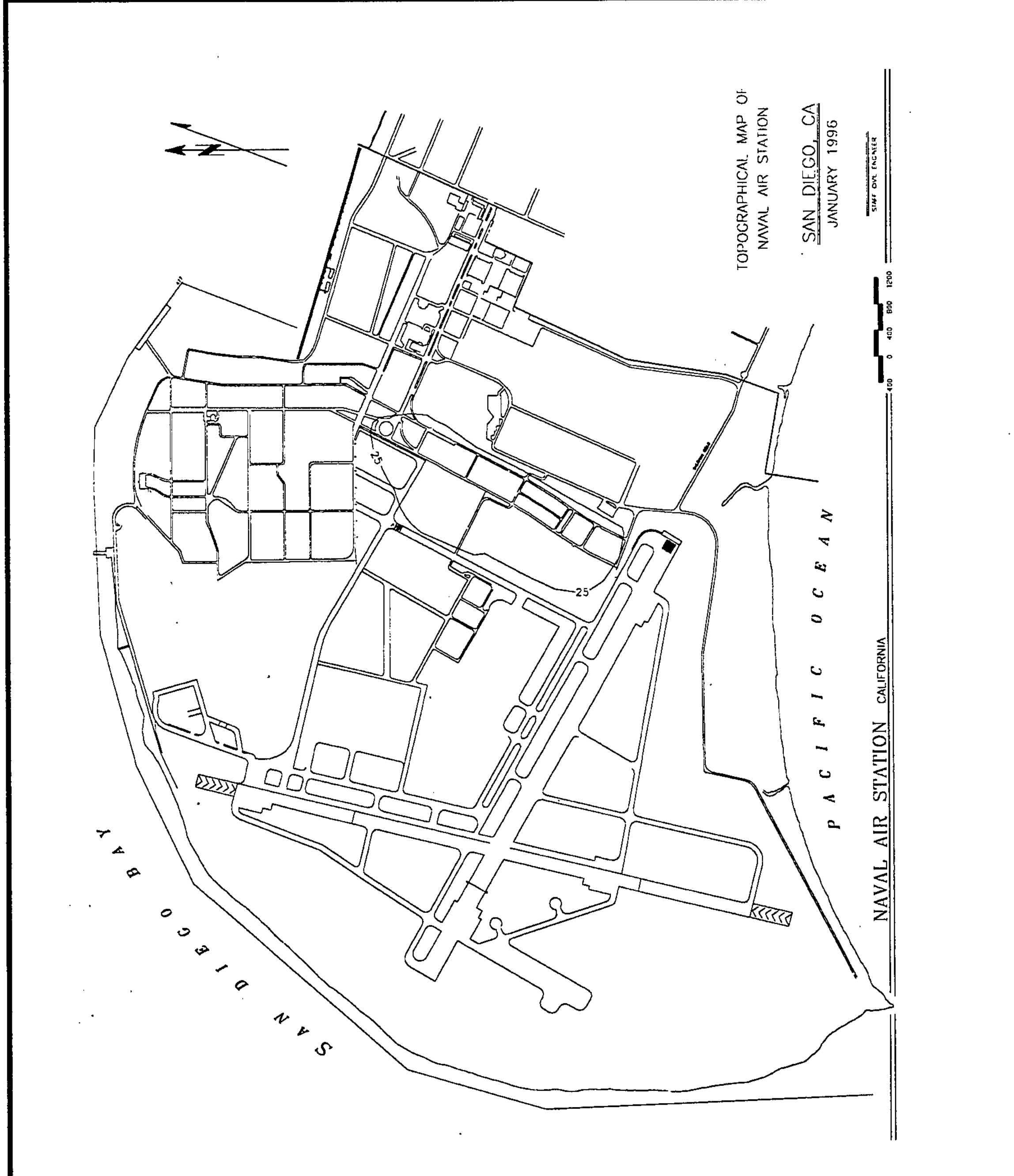


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FIGURE 3-2 TOPOGRAPHCIAL MAP NAVAL AIR STATION SPCC PLAN	TOPOGRAPHICAL MAP OF NAVAL AIR STATION

3.2. SUBDIVISION OF NAVAL AIR STATION INTO AREAS

Naval Air Station has been subdivided into multiple areas rather than being treated as a single area. These areas are described in Table 3-3. Naval Air Station drainage is described in Section 3.3 including drainage channels, control structures, treatment units, and receiving waters.

Section 3.4 provides the spill history for all the areas at the facility.

Drainage specific to each area, including flow directions, drainage channels, control structures, area-specific treatment units, is discussed in Section 5. All additional site-specific information required by 40 CFR 112 for these areas is presented in Section 5.

Table 3-3

Areas located at Naval Air Station

AREA NAME	TOPIC	DESCRIPTION
San Diego Gas & Electric Co.	Description of Area	Southeastern corner of building 369, along Rogers road
	Responsible Organization	San Diego Gas & Electric Co.
	Area Mission	Provides storage of diesel fuel for electricity generating plant.
	Building #	Bldg. 369
	Base Map Grid #	M-2
	Included Storage Areas (check all that apply)	X Aboveground Storage Tanks Underground Storage Tanks Mobile or Portable Storage Tanks Hazardous Waste/Hazardous Substance Storage Transformers Pipelines Tank Truck Loading/Unloading Areas Tank Truck Parking Areas
Air Traffic Control	Description of Area	Western side of building 793
	Responsible Organization	Air Traffic Control
	Area Mission	Area storage of diesel fuel for emergency generator
	Building #	Bldg. 793
	Base Map Grid #	S-17
	Included Storage Areas (check all that apply)	X Aboveground Storage Tanks Underground Storage Tanks Mobile or Portable Storage Tanks Hazardous Waste/Hazardous Substance Storage Transformers Pipelines Tank Truck Loading/Unloading Areas Tank Truck Parking Areas
Test Cell Center	Description of Area	Tank 1420-1 is located on the southeastern side of building 1420. Tanks 1420-2,3,4,5 are located on the south side of building 1420.
	Responsible Organization	Test Cell Center
	Area Mission	Provide storage of JP-5 fuel for jet engine testing.
	Building #	Bldg. 1420
	Base Map Grid #	EE-20
	Included Storage Areas (check all that apply)	X Aboveground Storage Tanks Underground Storage Tanks Mobile or Portable Storage Tanks Hazardous Waste/Hazardous Substance Storage Transformers Pipelines Tank Truck Loading/Unloading Areas Tank Truck Parking Areas

Table 3-3 Cont.

Areas located at Naval Air Station

AREA NAME	TOPIC	DESCRIPTION
Special Weapons Area	Description of Area	Tank T160-1 is located within building 812.
	Responsible Organization	Fire Protection, Special Weapons
	Area Mission	Tank T160-1 is a day tank for a diesel emergency generator.
	Building #	812
	Base Map Grid #	Z-30
	Included Storage Areas (check all that apply)	X Aboveground Storage Tanks Underground Storage Tanks Mobile or Portable Storage Tanks Hazardous Waste/Hazardous Substance Storage Transformers Pipelines Tank Truck Loading/Unloading Areas Tank Truck Parking Areas
Fuel Farm Tanks 962 and 963	Description of Area	Tanks 962 and 963 are located within the Fuel Farm
	Responsible Organization	NAS Fuels Div./Trajen (contractor)
	Area Facility Mission	Tanks 962 and 963 provide storage for JP-5
	Building #	Bldg. 429
	Base Map Grid #	J-21
	Included Storage Areas (check all that apply)	Aboveground Storage Tanks X Underground Storage Tanks Mobile or Portable Storage Tanks Hazardous Waste/Hazardous Substance Storage Transformers Pipelines Tank Truck Loading/Unloading Areas Tank Truck Parking Areas

3.3. FACILITY DRAINAGE AND WATER TREATMENT

A description of the general drainage of the host facility is provided in Table 3-4 in addition to a description of any treatment areas that treat the drainage water. This section describes the overall facility drainage including identifying the bodies of water which accept the facility drainage.

As required by 40 CFR 112.7(e)(1)(v), Table 3-5 provides a description of the treatment systems that are in place to treat the stormwater prior to discharge to the San Diego Bay and Pacific Ocean.

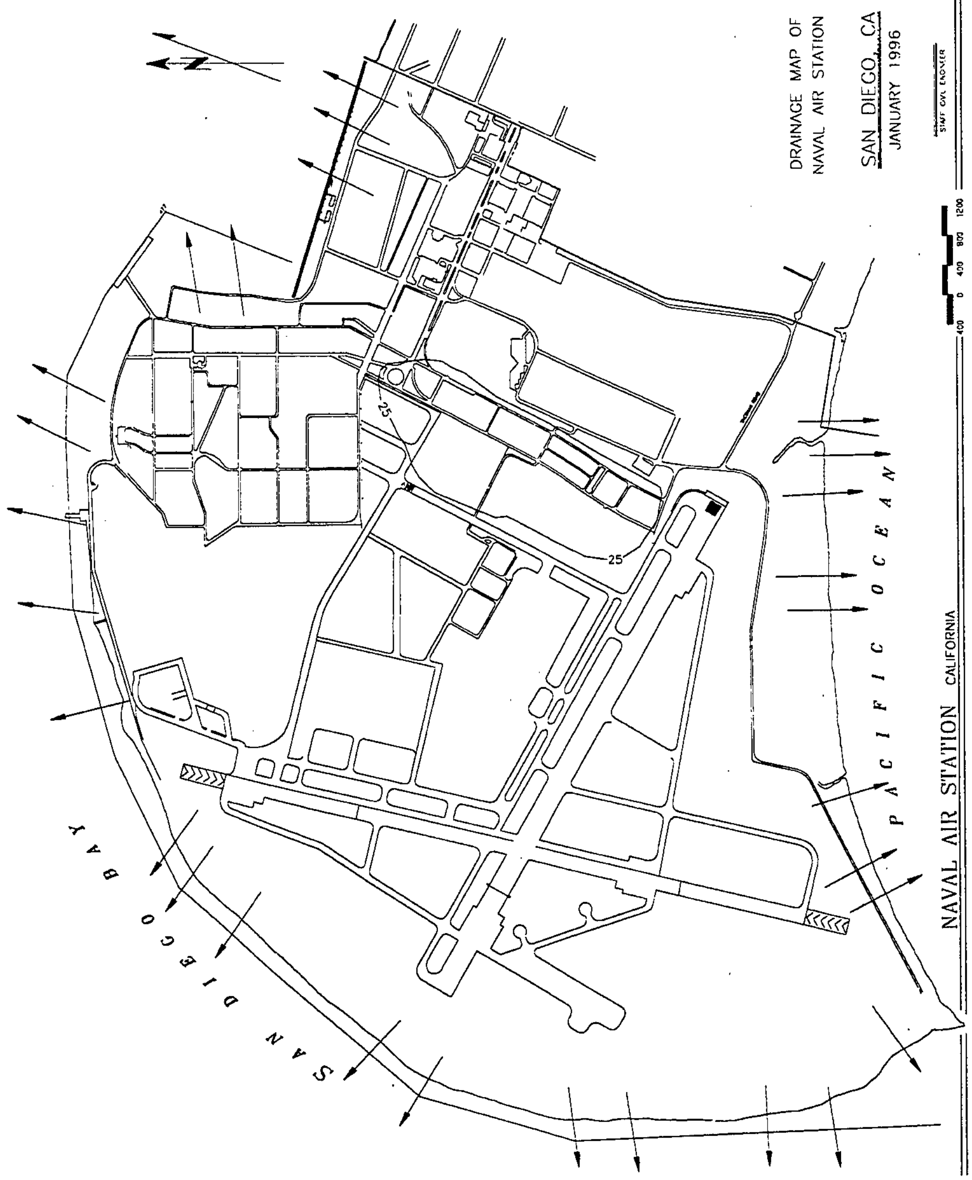
A description of the dikes, berms, diversion systems, catchment basins that are not area-specific is included. A map of the drainage system is provided in Figure 3-3.

Table 3-4
Facility Drainage

FACILITY DRAINAGE	
TOPIC	**DISCUSSION**
DRAINAGE DIRECTION(S)	Evaluated on area by area basis.
WATER BODIES TO WHICH FACILITY DRAINS (Name and Type, i.e. River, Lake, Bay, etc.)	San Diego Bay and Pacific Ocean
CONTAINMENT AND DIVERSION STRUCTURES	Evaluated on area by area basis.
FLOODING POTENTIAL	low
OTHER:	

Table 3-5
Facility Drainage Water Treatment Systems

FACILITY DRAINAGE WATER TREATMENT UNIT	
TOPIC	**DISCUSSION**
TYPE(S)	There are no water treatment systems at this facility.
FLOW BETWEEN TREATMENT UNITS (if multiple units; gravity or pumps)	NA
NUMBER OF LIFT PUMPS (if multiple units)	NA
FREQUENCY OF OPERATION	NA
FACILITY	NA
FAIL-SAFE PROVISIONS (to prevent discharge due to equipment/operator failure)	NA
OTHER:	



FILE: NASDRAINAGE.DWG

FIGURE 3-3 DRAINAGE MAP NAVAL AIR STATION SPCC PLAN	DRAINAGE MAP OF NAVAL AIR STATION ←—— MAIN STORMDRAIN OUTFALLS

3.4. SPILL HISTORY

As required by 40 CFR 112.7 (a), this subsection includes a description of past oil spill events occurring within the past twelve months of the preparation of this plan. Table 3-5 presents spill information from all the areas on the facility. This record includes spills that were contained and did not impact navigable waters. In addition, this subsection includes a discussion of any corrective action taken to mitigate the spill and provide steps taken to prevent any possibility of potential recurrence. There have been no spill events within the past twelve months at this area.

3.5. INSPECTIONS AND TESTS

3.5.1. Inspections

SPCC regulations, (40 CFR 112.7(e)(1)(ii)), require that secondary containment systems that do not discharge to a treatment system be inspected before the water is discharged. Periodic inspections and integrity testing of aboveground storage tanks are required; frequent visual observations of the tanks for signs of deterioration or leaks are also required by 40 CFR 112.7(e)(2)(vi).

In accordance with 40 CFR 112.7(e)(3)(i), buried pipelines are examined for corrosion each time they are exposed. Aboveground pipelines and valves are also examined on a regular basis as required by 40 CFR 112.7(e)(2)(iv).

The inspections required by 40 CFR 112 have been performed in accordance with the written procedures developed for the area. The written procedures and blank inspection forms are located in the Appendix D of this SPCC Plan. A record of the inspections, signed by the appropriate supervisor or inspector, is located in Appendix E of this SPCC Plan and is maintained for a period of at least three years. These inspections are conducted on an area basis.

3.5.2. Testing

In addition to inspections, SPCC regulations (40 CFR 112.7 (e)) require testing: pressure testing of USTs, integrity testing of ASTs, operational testing of liquid sensing devices on all bulk storage tanks, and pressure testing of pipelines in areas where area drainage is such that a failure might lead to a spill event. These tests are conducted on an area basis.

3.6. SECURITY

The Naval Air Station maintains the following security procedures. The Naval Station is fully fenced, and entrance gates are locked and/or guarded. Security patrols visit the gate on a daily schedule.

All visitors to the facility are required to obtain a badge from the facility security office.

Military Police are on duty 24 hours per day, seven days per week.

Security measures specific to areas are discussed in the appropriate subsection of Section 5. Table 3-6 presents the security measures provided by Naval Air Station.

Table 3-6

Facility Security Measures

TOPIC	DESCRIPTION
PERIMETER FENCING	Entire base is secured at all times
ENTRANCE GATES	Secured at all times
CONTROL OF VISITORS	Any visitors must receive clearance from NAS Security
SECURITY PATROLS (DAY)	Roving Patrol
SECURITY PATROLS (NIGHT)	Roving Patrol
LIGHTING	24 hour
OUT OF SERVICE PIPELINES OR TANKS NOT BELONGING TO AREAS	
OTHER	n/a

3.7. TRAINING

To prevent the discharges of oil and hazardous substance and to ensure compliance with applicable pollution control laws, rules, and regulations, Naval Air Station instructs the operating personnel in the proper use and maintenance of equipment (40 CFR 112.7(e)(10)). Spill prevention briefings for operating personnel are scheduled and conducted at intervals frequent enough to assure adequate understanding of the SPCC Plan for their area. Such spill prevention briefings highlight and describe known spill events or failures, malfunctioning components, and recently developed precautionary measures. Personnel are trained in pollution control laws, rules and regulations, and in the operation and maintenance of equipment through continuing on-the-job training. Each area also conducts spill prevention briefings. The organizations responsible for spill prevention briefings, operation and maintenance training, and training in regulatory requirements are listed in Table 3-7.

Table 3-7

Organizations Responsible for Training

AREA	ORGANIZATION	LOCATION OF TRAINING RECORDS
San Diego Gas & Electric Co.	San Diego Gas & Electric Co.	SCE Environmental
Air Traffic Control	Air Traffic Control	SCE Environmental
Test Cell Center	NAS Fuels Division	SCE Environmental
Special Weapons Area	Fire Protection, Special Weapons	SCE Environmental
Fuel Farm Tanks 962 and 963	NAS Fuels Div./Trajen.	SCE Environmental

4. DESCRIPTION OF STORAGE

This section includes a summary of the types of storage tanks, materials and quantities stored, and areas on the facility that are required to be covered under this SPCC Plan as defined by 40 CFR 112.1. Tanks and containers included in this plan are aboveground storage tanks (including heating oil tanks), underground storage tanks, oil/water separators, mobile or portable storage tanks, hazardous waste/hazardous substance storage areas (including drums), transformers, pipelines and other transfer equipment, and tanker truck loading racks and parking areas. The area where each item is located is also identified. The items are discussed in detail in Section 5 and organized by area.

4.1. ABOVEGROUND STORAGE TANKS

This subsection includes a summary of aboveground storage tanks located throughout the facility developed through the field survey. Table 4-1 provides information identifying location of tank, capacity of tank, tank material, type of material stored, year installed, and type of secondary containment.

Table 4-1

Aboveground Tank Summary

AREA	TANK SITE BLDG. #	TANK #	BASE MAP (grid)	CAPACITY (gal)	TANK MATERIAL	MATERIAL STORED	YEAR INSTALLED	TYPE OF SECONDARY CONTAINMENT
Area 1: SCE								
San Diego Gas & Electric Co								
"	369	T369	M-2	285,000	Steel	Diesel	1971	Concrete wall with gravel base
Air Traffic Control								
"	793	T793	S-17	6,000	Steel	Diesel	1995	Double Wall
Test Cell Center								
"	1420	T1420-1	EE-20	5,000	Steel	JP-5	unknown	Concrete wall
"	1420	T1420-2,3,4,5	EE-20	1,000	Steel	JP-5	unknown	Concrete wall
Special Weapons Area								
"	812	T160-1	Z-30	40	Steel	Diesel	unknown	none

COMMENTS:
The Base Map/Grid column identifies the base map sheet and grid on that sheet of the area, not individual tank sites.
This list of SPCC-regulated tanks does NOT include:
tanks not owned or operated by the Navy (e.g., contractor-owned tanks, civilian-owned tanks used by tenants, and privately-owned tanks;
ASTs not regulated by 40 CFR 112;
small ASTs possibly overlooked during canvassing and no longer receiving oil or hazardous substance; and
unpiped ASTs not being used for storage (these MUST be "permanently closed")

Updated: 8/18/97

4.2. UNDERGROUND STORAGE TANKS

This subsection includes a summary of all basewide underground storage tanks. Table 4-2 provides information identifying the tank location, tank capacity, tank material, type of material stored, year installed, and type of leak detection control systems.

Table 4-2

Underground Tank Summary

AREA	TANK SITE BLDG. #	TANK #	BASE MAP (GRID)	CAPACITY (GAL)	TANK MATERIAL	MATERIAL STORED	YEAR INSTALLED	TYPE OF LEAK DETECTION SYSTEM
Area 1: Fuel Farm Tanks 962 and 963								
Fuel Farm Tanks 962, 963								
	Fuel Farm	T962	J-21	250,000	concrete	JP-5	1942	none
	Fuel Farm	T963	J-21	250,000	concrete	JP-5	1942	none
COMMENTS: The Base Map/Grid column identifies the base map sheet and grid on that sheet of the area, not individual tank sites. This list of SPCC-regulated tanks does NOT include: tanks not owned or operated by the Navy (e.g., contractor-owned tanks, civilian-owned tanks used by tenants, and privately-owned tanks; USTs not regulated by 40 CFR 112.								

Updated: 8/18/97

4.3. PIPELINES

This subsection includes a summary of aboveground and underground pipelines transporting oil and hazardous substance located throughout the facility. Table 4-3 provides information-identifying location, size of pipe, pipeline material of construction, type of materials transferred, and secondary containment.

Table 4-3

Pipelines

AREA	SITE BLDG. #	INSTALLATION MAP (GRID)	SIZE OF PIPELINE	PIPELINE MATERIALS	MATERIALS TRANSFERRED	TYPE OF SECONDARY CONTAINMENT
Area 1: Fuel Farm						
Fuel Farm Tanks 962 and 963						
	429	J-21	unknown	steel	JP-5	none
COMMENTS: The Installation Map/Grid column identifies the Installation map sheet and grid on that sheet of the area, not individual pipelines.						

4.4. TANK TRUCK LOADING AND UNLOADING AREAS

This subsection includes summary information for tanker truck loading and unloading areas located throughout the facility. Table 4-4 provides information-identifying locations, number of racks or bays, type of material transferred, and type of secondary containment.

Table 4-4

Tanker Truck Loading and Unloading Areas

AREA	SITE BLDG. #	INSTALLATION MAP (GRID)	NUMBER OF TRUCK RACKS OR BAYS	MATERIALS TRANSFERRED	TYPE OF SECONDARY CONTAINMENT
Area 1: San Diego Gas & Electric Co.					
San Diego Gas & Electric					
	369	M-2	unknown	Diesel	Speed bump berms
Area 2: Fuel Farm					
Fuel Farm Tanks 962 and 963					
"	429	J-21	unknown	JP-5	Berms
COMMENTS: The Installation Map/Grid column identifies the Installation map sheet and grid on that sheet of the area, not individual loading/unloading areas.					

5. AREA-SPECIFIC INFORMATION

Detailed information for each area defined in Section 3.2 is provided in the following subsections.

5.1. SAN DIEGO GAS & ELECTRIC

5.1.1. General Information

General information on the area is provided in Table 5.1-1. This information includes the name of the area, responsible operator, type of area, year of initial operation, hours of operation, storage capacity and throughput, location, and designated person. An area diagram is provided in Figure 5.1-1. This figure shows the location of the storage and transfer equipment identified in this section in addition to the location of the control structures and the drainage flow directions.

Table 5.1-1

Area Information

AREA NAME		San Diego Gas & Electric Co.
ALTERNATIVE NAMES (old, unofficial, etc.)		None
OPERATOR (dept., command, tenant, etc.)		San Diego Gas & Electric Co.
TYPE OF AREA		Diesel fuel storage for electricity generating plant
DESCRIPTION OF AREA		Tank 369 has a capacity of 285,000 gallons. It has a cement block wall for secondary containment. Associated pumps and network piping are contained within similar cement block walls.
DATE OF INITIAL AREA OPERATION		1971
HOURS/DAY NORMALLY ATTENDED		8 hours
MAXIMUM OIL STORAGE CAPACITY		285,000 gallons
MAXIMUM HAZARDOUS SUBSTANCE STORAGE CAPACITY		NA
NORMAL DAILY OIL THROUGHPUT		NA
NORMAL DAILY HAZARDOUS SUBSTANCE THROUGHPUT		NA
ADDRESSES	MAILING	same as for facility
	PHYSICAL(if different)	
	Installation Grid Map #	M-2
PHONE NUMBERS	24-HR	same as for facility
	DAY	same as for facility
	FAX	
DESIGNATED PERSON	NAME	Mr. Mike Mitchell
(Accountable for spill prevention)	POSITION	SCE Code 18E
(Primary)	FAX PHONE	(619) 123-4567
	24-HR PHONE	(619) 234-5678
DESIGNATED PERSON	NAME	NA
(Alternate)	POSITION	CDO Quarterdeck
	WORK PHONE	NA
	24-HR PHONE	(619) 345-6789

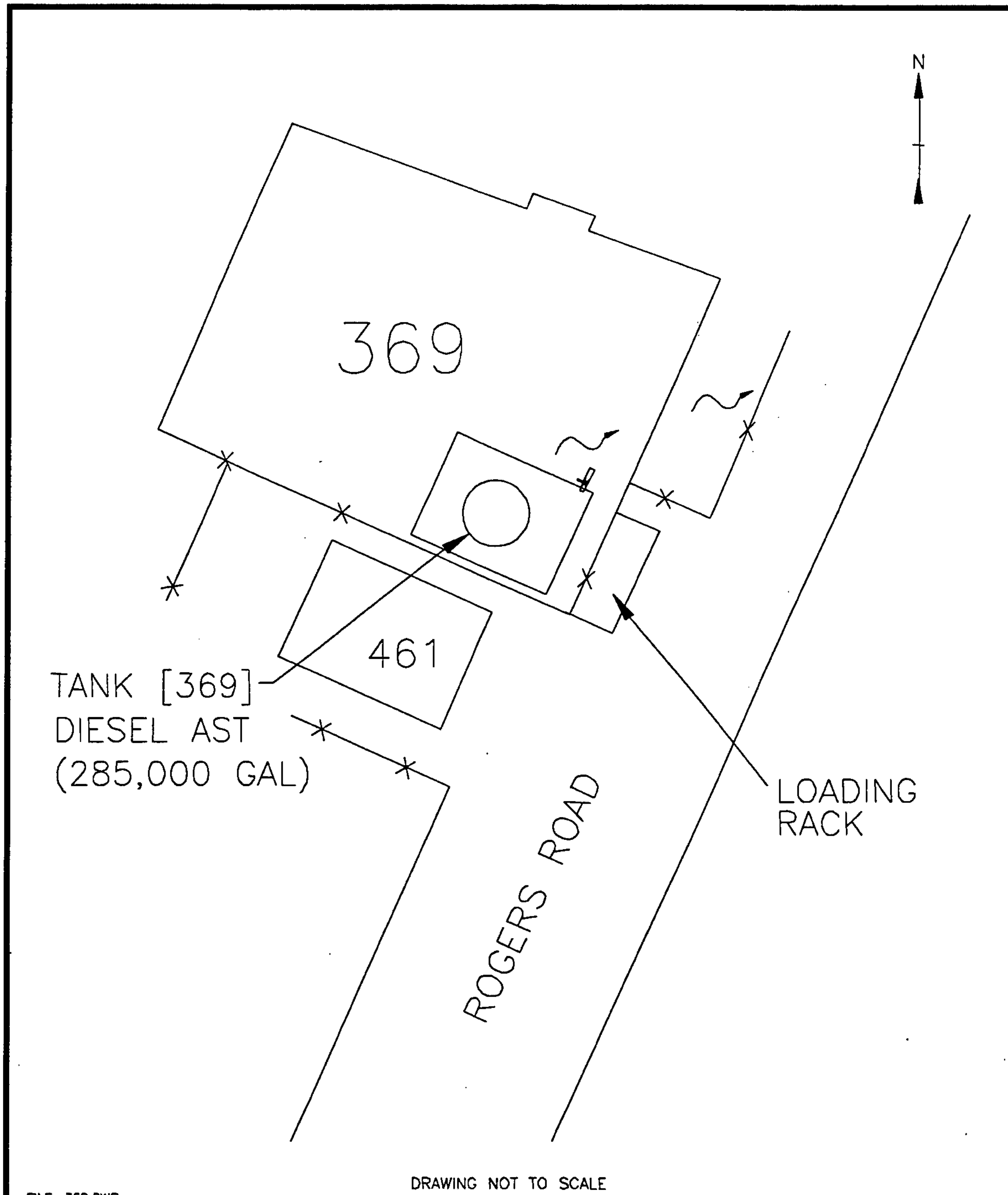


FIGURE 5.1-1
BUILDING #369
SAN DIEGO GAS &
ELECTRIC
NAVAL AIR STATION
SPCC PLAN

LEGEND
ABOVEGROUND STORAGE TANK
FENCE
EXPECTED SPILL DIRECTION
CLOSED DRAIN VALVE

5.1.2. Area Drainage

Table 5.1-2 presents the information pertaining to the drainage and drainage control structures of the area.

Table 5.1-2

Area Drainage

DRAINAGE SYSTEMS: SAN DIEGO GAS & ELECTRIC CO		
TOPIC		INFORMATION
DRAINAGE CONTROL	FUNCTION OF DIKED AREAS	Large storage tank
	DIVERSIONARY STRUCTURES	
	LAGOONS OR CATCHMENT BASINS	Loading/unloading rack has speed bump berms
	LAGOONS OR CATCHMENT BASIN FLOODING POTENTIAL	Not subject to flooding
	SPILL CONTINGENCY PLAN OR COMMITMENT OF MANPOWER & EQUIPMENT	
DIKE STRUCTURES (if not covered in equipment specific tables)	TYPE	Cement block wall with gravel base
	LINING	none
	DIMENSIONS	91'x81'x6'3" (LxWxH)
	CALCULATED VOLUME (gal)	345000
	DRAINAGE MECHANISM	manual open and close valve
	DRAINAGE PUMP CONTROL	manual after inspection of water
	DRAINAGE OUTFALL	to truck hook up
	DRAINAGE VALVE LOCKING	locked
	VISUAL INSPECTION SCHEDULE	inspected before draining
	LOCATION OF DIKE DRAINAGE RECORDS	Building 369
	OTHER:	
WATER TREATMENT UNIT	TYPE(S)	NA
	FLOW BETWEEN TREATMENT UNITS	NA
	NUMBER OF LIFT PUMPS	NA
	NA	

Table 5.1-2 Cont.
Area Drainage

DRAINAGE SYSTEMS: SAN DIEGO GAS & ELECTRIC CO		
TOPIC		INFORMATION
	INSTALLATION	NA
	FAIL-SAFE PROVISIONS	NA
	OTHER:	
PLANT EFFLUENT	DISCHARGE POINT(S)	NA
	FREQUENCY OF OBSERVATION	NA

5.1.3. Aboveground Storage Tanks [Including Partially Buried Tanks]

This section includes the information required in 40 CFR 112.7(b) and 112.7(e)(2) and pertaining to aboveground storage tanks and partially buried storage tanks. This information is summarized in Table 5.1-3.

This section includes the information required in 40 CFR 112.7(b) and 112.7(e)(2) and pertaining to aboveground storage tanks and partially buried storage tanks. This information is summarized in Table 5.1-3.

Table 5.1-3
Aboveground Storage Tanks

TANK INFORMATION: SAN DIEGO GAS & ELECTRIC CO (TANK 369/BUILDING #369)		
TOPIC		INFORMATION
GENERAL INFORMATION	BASE MAP GRID #	M-2
	NUMBER OF TANKS IN SET	1
	NOMINAL CAPACITY (gal)	285,000
	MATERIAL STORED	Diesel
PIPING	MATERIAL	steel
	EXPOSURE	All aboveground
	SUPPORT DESIGN	minimizes abrasion/corrosion
	CORROSION PROTECTION	paint
	PROTECTION FROM VEHICLES	tank secondary containment
	CONTAINMENT	all piping within tank containment
SECURITY	VALVES OPENING TO SURFACE	all locked
	PUMP STARTER CONTROLS	locked whenever off and inaccessible to authorized personnel
	LIGHTING	light at tank

Table 5.1-3 Cont.
Aboveground Storage Tanks

TANK INFORMATION: SAN DIEGO GAS & ELECTRIC CO (TANK 369/BUILDING #369)		
TOPIC		INFORMATION
	FIRE PROTECTION SYSTEM	automatic AFFF
MATERIAL SUPPLIER	NAME	unknown
	TRUCK PUMPING RATE (gpm)	unknown
	PIPING DELIVERY RATE (gpm)	unknown
INSPECTIONS AND TESTS	TANK INTEGRITY TESTING SCHEDULE	Annual leak test and 6 year internal inspection & cleaning.
	VISUAL INSPECTION SCHEDULE	Tank receives monthly visual inspection.
PROBABILITY OF REACHING NAVIGABLE WATERS		high
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	overfill (via tank truck)
	PREDICTION OF SPILL DIRECTION	northeast
	PREDICTION OF SPILL RATE OF FLOW	250 gal/min
	PREDICTION OF TOTAL SPILL QUANTITY	250 gal
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	Rupture
	PREDICTION OF SPILL DIRECTION	northeast
	PREDICTION OF SPILL RATE OF FLOW	4,750 gal/min
	PREDICTION OF TOTAL SPILL QUANTITY	285,000 gal
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	leakage
	PREDICTION OF SPILL DIRECTION	northeast
	PREDICTION OF SPILL RATE OF FLOW	28.27 gal/min
	PREDICTION OF TOTAL SPILL QUANTITY	28,500 gal
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	faulty piping, etc.
	PREDICTION OF SPILL DIRECTION	northeast
	PREDICTION OF SPILL RATE OF FLOW	197.92 gal/min
	PREDICTION OF TOTAL SPILL QUANTITY	28,500 gal

5.1.4. Tanker Truck Loading/Unloading Areas

This section includes the information required by 40 CFR 112.7(b) and 112.7(e)(4) pertaining to tanker truck loading/unloading areas. This information is summarized in Table 5.1-4.

Table 5.1-4

Tank Truck Loading/Unloading Site

TRUCK LOADING/UNLOADING SITE INFORMATION: SAN DIEGO GAS & ELECTRIC CO		
TOPIC		INFORMATION
GENERAL INFORMATION	NUMBER OF RACKS OR BAYS	unknown
	CAPACITY OF LARGEST SINGLE TRUCK COMPARTMENT (gal)	250 gal
	MATERIAL TRANSFERRED	Diesel
	YEAR INSTALLED	1971
	CURRENT USE	In service
	MEETS DOT REQUIREMENTS	Yes
SECURITY	INTERLOCKED DEVICES	The air brakes of refueler trucks are locked during refueling to prevent premature drive-away.
SECONDARY CONTAINMENT	TYPE	Loading/unloading rack has speed bump berms
	LINING	NA
	DIMENSIONS	NA
	CALCULATED VOLUME (gal)	NA
	DRAINAGE MECHANISM	Manual valve
	DRAINAGE OUTFALL	Navigable water
	DRAINAGE VALVE LOCKING	locked at all times
INSPECTIONS AND TESTS	LOWER MOST DRAINS AND OUTLETS	visually inspected
PROBABILITY OF REACHING NAVIGABLE WATERS		high
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	overfill
	PREDICTION OF SPILL DIRECTION	northeast
	PREDICTION OF SPILL RATE OF FLOW	250 gal/min
	PREDICTION OF TOTAL SPILL QUANTITY	250 gal

5.1.5. Inspections and Tests

5.1.5.1. Inspections

40 CFR 112.7(e)(1)(ii) requires inspections for area drainage systems without treatment systems prior to discharge; these inspections are required to meet water

quality objectives. In accordance with 40 CFR 112.7(e)(2)(vi), inspections and integrity testing of aboveground storage tanks is performed on a periodic basis along with frequent visual observations of the tanks for signs of deterioration or leaks. Buried pipelines are examined for corrosion each time they are exposed (40 CFR 112.7(e)(3)(i)). In accordance with 40 CFR 112.7(e)(3)(iv), aboveground pipelines and valves are also examined on a regular basis.

Inspections required by 40 CFR 112 are also in accordance with written procedures developed for the area. These written procedures are found in APPENDIX D. A record of the inspections, signed by the appropriate supervisor or inspector, is located in APPENDIX E of this SPCC Plan and is maintained for a period of at least three years. The inspections listed in Table 5.1-5 has been conducted at this area.

Pressure testing, but not inspections are required for USTs.

Table 5.1-5

Inspections Conducted by San Diego Gas & Electric Co.

TYPE (frequency) (regulation number)	INSPECTION LOCATION	LOCATION WHERE WRITTEN PROCEDURE CAN BE FOUND	LOCATION OF INSPECTION RECORDS	WHO PERFORMS INSPECTIONS
ACCUMULATED RAIN WATER (before draining) (40 CFR 112.7(e)(1)(ii))	Bldg. 369	APPENDIX D	APPENDIX E	Public Works Center
AST SUPPORTS AND FOUNDATIONS (at integrity testing) (40 CFR 112.7(e)(2)(vi))	Bldg. 369	APPENDIX D	APPENDIX E	Integrity testing contractors
VISUAL INSPECTION OF ASTs (monthly) (40 CFR 112.7(e)(2)(vi))	Bldg. 369	APPENDIX D	APPENDIX E	Integrity testing contractors
BURIED PIPELINE (when exposed for any reason) (40 CFR 112.7(e)(3)(i))	NA	APPENDIX D	APPENDIX E	NA
ABOVEGROUND PIPELINES AND VALVES (monthly) (40 CFR 112.7(e)(3)(iv))	Bldg. 369	APPENDIX D	APPENDIX E	Integrity testing contractors

5.1.5.2. Testing

Tests required by 40 CFR 112.7(e) include regular pressure testing of aboveground storage tanks, periodic integrity testing of aboveground storage tanks, regular testing of liquid sensing devices on all bulk storage tanks, and periodic pressure testing of pipelines in areas where area drainage is such that a failure might lead to a spill event. The tests listed in Table 5.1-6 are conducted by this area.

Table 5.1-6

Tests conducted by the San Diego Gas & Electric Co.

TYPE (frequency) (regulation number)	TEST LOCATION	DOCUMENT WHERE WRITTEN PROCEDURE CAN BE FOUND	LOCATION OF TEST RECORDS	WHO PERFORMS TESTING
PRESSURE TESTING OF USTs (frequency) (40 CFR 112.7(e)(2)(iv))	NA	APPENDIX D	APPENDIX E	NA
INTEGRITY TESTING OF ASTs (annual) (40 CFR 112.7(e)(2)(vi))	Bldg. 369	APPENDIX D	APPENDIX E	Integrity testing contractors
TESTING OF PROPER OPERATION OF LIQUID SENSING DEVICES (monthly) (40 CFR 112.7(e)(2)(viii)(E))	Bldg. 369	APPENDIX D	APPENDIX E	Integrity testing contractors
PRESSURE TESTING OF PIPELINES (frequency, and where warranted) (40 CFR 112.7(e)(3)(iv))	NA	APPENDIX D	APPENDIX E	NA

5.1.6. Security

All areas handling, processing, and storing oil or hazardous substances are fully fenced, and entrance gates are locked and/or guarded when the area is not in operation or is unattended.

The master flow and drain valves and other valves that permit direct outward flow of the tank's content to the surface are securely locked in the closed position when in non-operating or non-standby status. The starter control on all oil pumps is locked in the "off" position or located at a site accessible only to authorized personnel when the pumps are in a non-operating or non-standby status.

The loading/unloading connections of oil and hazardous substance pipelines are securely capped and blank-flanged when not in service or in standby service for an extended time. These security practices also apply to pipelines that are emptied of liquid content either by draining or by inert gas pressure.

Area lighting is mercury vapor to: (A) aid in the discovery of spills occurring during hours of darkness, both by operating personnel, if present, and by non-operating personnel (the general public, local police, etc.) and (B) prevent spills occurring through acts of vandalism.

Table 5.1-7 lists security measures in place at San Diego Gas & Electric Co..

Table 5.1-7

San Diego Gas & Electric Co Security Measures

TOPIC	DESCRIPTION
FENCING (of facility or tanks)	Entire Installation is secured at all times
ENTRANCE GATES	Secured at all times
CONTROL OF VISITORS	Any visitors must receive clearance from NAS Security
SECURITY PATROLS (DAY) (other than normal installation patrol)	Roving patrol
SECURITY PATROLS (NIGHT) (other than normal installation patrol)	Roving patrol
VALVING CONTROL	Locked
LIGHTING:	Light at tank
OUT OF SERVICE PIPELINES OR TANKS	NA
OTHER	

5.1.7. Achieving Compliance

Table 5.1-8 identifies the areas of non-compliance known to exist at San Diego Gas & Electric Co. The corrective action for each non-compliance issue is shown, as is the anticipated date of implementation of the corrective action.

Table 5.1-8

Compliance Schedule

NON-COMPLIANCE ISSUE	COMPLIANCE PLAN/CORRECTIVE ACTION	IMPLEMENTATION DATE
None		

5.2. AIR TRAFFIC CONTROL

5.2.1. General Area Information

General information on the area is provided in Table 5.2-1. This information includes the name of the area, responsible operator, type of area, year of initial operation, hours of operation, storage capacity and throughput, location, and designated person. An area diagram is provided in Figure 5.2-1. This figure shows the location of the storage and transfer equipment identified in this section in addition to the location of the control structures and the drainage flow directions.

Table 5.2-1
Area Information

AREA NAME		Air Traffic Control
ALTERNATIVE NAMES (old, unofficial, etc.)		None
OPERATOR (dept., command, tenant, etc.)		Air Traffic Control
TYPE OF AREA		Provides storage of diesel fuel for emergency generator
DESCRIPTION OF AREA		western side of building 793
DATE OF INITIAL AREA OPERATION		1995
HOURS/DAY NORMALLY ATTENDED		24
MAXIMUM OIL STORAGE CAPACITY		6,000 gal
MAXIMUM HAZARDOUS SUBSTANCE STORAGE CAPACITY		NA
NORMAL DAILY OIL THROUGHPUT		None
NORMAL DAILY HAZARDOUS SUBSTANCE THROUGHPUT		NA
ADDRESSES	MAILING	same as for facility
	PHYSICAL (if different)	
	Installation Grid Map #	S-17
PHONE NUMBERS	24-HR	same as for facility
	DAY	same as for facility
	FAX	
DESIGNATED PERSON	NAME	Mr. Mike Mitchell
(Accountable for spill prevention) (Primary)	POSITION	SCE Code 18E
	WORK PHONE	(619) 123-4567
	24-HR PHONE	(619) 234-5678
DESIGNATED PERSON (Alternate)	NAME	NA
	POSITION	CDO Quarterdeck
	WORK PHONE	NA
	24-HR PHONE	(619) 345-6789

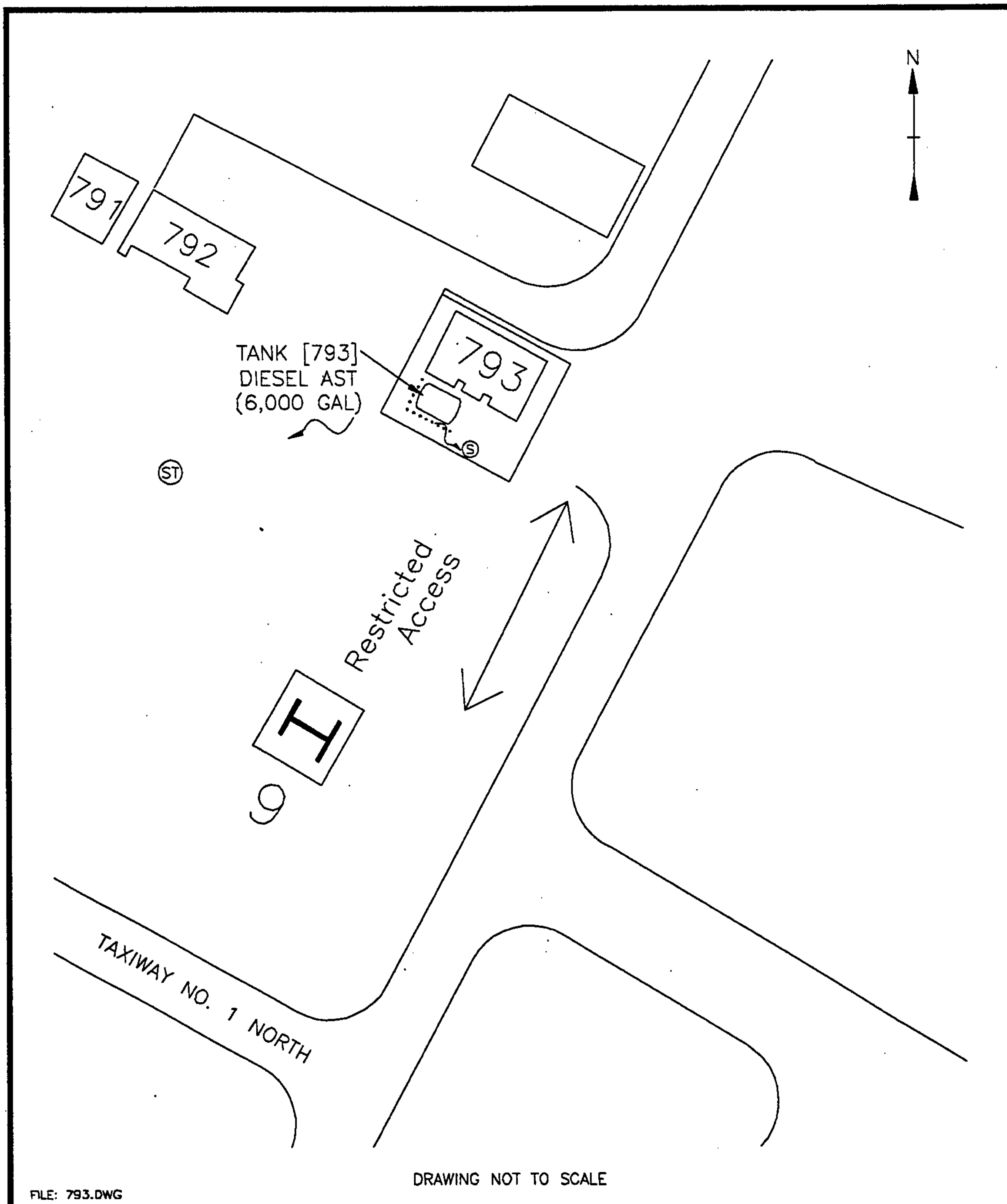


FIGURE 5.2-1
BUILDING #793
AIRCRAFT TRAFFIC CONTROL
NAVAL AIR STATION
SPCC PLAN

LEGEND

- ABOVEGROUND STORAGE TANK
- EXPECTED SPILL DIRECTION
- POST
- ST STORM DRAIN
- S SEWER DRAIN

5.2.2. Area Drainage

There are currently no drainage or drainage control structures in this area. Aircraft parking (approximately 200 feet) has no drainage containment.

5.2.3. Aboveground Storage tanks [Including Partially Buried Tanks]

This section includes the information required in 40 CFR 112.7(b) and 112.7(e)(2) and pertaining to aboveground storage tanks and partially buried storage tanks. This information is summarized in Table 5.2-2.

Table 5.2-2

Aboveground Storage Tanks

TANK INFORMATION: AIR TRAFFIC CONTROL (BLDG 793)		
TOPIC		INFORMATION
GENERAL INFORMATION	INSTALLATION MAP GRID #	S-17
	NUMBER OF TANKS IN SET	1
	NOMINAL CAPACITY (gal)	6,000
	MATERIAL STORED	Diesel
	TANK MANUFACTURER/MODEL	Envirovault
	YEAR INSTALLED	1995
	TYPE TANK	AST
	CURRENT USE	fuels emergency generator
	CONDITION	new
PHYSICAL DESCRIPTION	COLOR PAINTED	white
	MARKING FOR MATERIAL STORED	acceptable
	DIMENSIONS	25'x7'x7' (LxWxH)
	CONSTRUCTION/MATERIAL	welded steel compatible with contents
	SHAPE	horizontal cylinder
SUPPORT	CONSTRUCTION	steel frame with saddles, steel frame welded to tank
	SEISMIC/WIND ADEQUACY	adequate
CORROSION PROTECTION		NA
SECONDARY CONTAINMENT	TYPE	double wall of tank
	LINING	NA
	DIMENSIONS	unknown
	CALCULATED VOLUME (gal)	unknown
	DRAINAGE MECHANISM	none
	DRAINAGE OUTFALL	10' away from sewer
	DRAINAGE VALVE LOCKING	none
OVERFILL	FAIL-SAFE ENGINEERING	float indicator
	CATCHMENT	catch pan at AST fill port
TANK HEATING		none
TANK MANIFOLDING		none

Table 5.2-2 Cont.

Aboveground Storage Tanks

TANK INFORMATION: AIR TRAFFIC CONTROL (BLDG 793)		
TOPIC		INFORMATION
PIPING	MATERIAL	steel
	EXPOSURE	all aboveground
	SUPPORT DESIGN	minimizes abrasion and corrosion
	CORROSION PROTECTION	paint and cathodic protection
	PROTECTION FROM VEHICLES	traffic barrier posts, away from road, warning signs
	CONTAINMENT	none
SECURITY	VALVES OPENING TO SURFACE	NA (no such valve)
	PUMP STARTER CONTROLS	inaccessible to unauthorized personnel
	LIGHTING	none
	FIRE PROTECTION SYSTEM	none
MATERIAL SUPPLIER	NAME	Unknown
	TRUCK PUMPING RATE (gpm)	est. 250
	PIPING DELIVERY RATE (gpm)	NA
INSPECTIONS AND TESTS	TANK INTEGRITY TESTING SCHEDULE	Annual leak test and 6 year internal inspection & cleaning.
	VISUAL INSPECTION SCHEDULE	Tank receives monthly visual inspection.
PROBABILITY OF REACHING NAVIGABLE WATERS		high
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	overfill via tank truck
	PREDICTION OF SPILL DIRECTION	west
	PREDICTION OF SPILL RATE OF FLOW	250 gpm
	PREDICTION OF TOTAL SPILL QUANTITY	250 gal
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	rupture
	PREDICTION OF SPILL DIRECTION	west
	PREDICTION OF SPILL RATE OF FLOW	100 gpm
	PREDICTION OF TOTAL SPILL QUANTITY	6,000 gal
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	leakage
	PREDICTION OF SPILL DIRECTION	west
	PREDICTION OF SPILL RATE OF FLOW	0.60 gpm
	PREDICTION OF TOTAL SPILL QUANTITY	600 gal

Table 5.2-2 Cont.

Aboveground Storage Tanks

TANK INFORMATION: AIR TRAFFIC CONTROL (BLDG 793)		
TOPIC		INFORMATION
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	faulty piping, etc.
	PREDICTION OF SPILL DIRECTION	west
	PREDICTION OF SPILL RATE OF FLOW	4.17 gpm
	PREDICTION OF TOTAL SPILL QUANTITY	600 gal

5.2.4. Inspections and Tests

5.2.4.1. Inspections

40 CFR 112.7(e)(1)(ii) requires inspections for area drainage systems without treatment systems prior to discharge; these inspections are required to meet water quality objectives. In accordance with 40 CFR 112.7(e)(2)(vi), inspections and integrity testing of aboveground storage tanks is performed on a periodic basis along with frequent visual observations of the tanks for signs of deterioration or leaks. In accordance with 40 CFR 112.7(e)(3)(iv), aboveground pipelines and valves are examined on a regular basis.

Inspections required by 40 CFR 112 are also in accordance with written procedures developed for the area. These written procedures are found in APPENDIX D. A record of the inspections, signed by the appropriate supervisor or inspector, is located in APPENDIX E this SPCC Plan and is maintained for a period of at least three years. The inspections listed in Table 5.2-3 have been conducted at this area.

Pressure testing, but not inspections are required for USTs.

Table 5.2-3

Inspections conducted by Air Traffic Control

TYPE (frequency) (regulation number)	INSPECTION LOCATION	LOCATION WHERE WRITTEN PROCEDURE CAN BE FOUND	LOCATION OF INSPECTION RECORDS	WHO PERFORMS INSPECTIONS
ACCUMULATED RAIN WATER (before draining) (40 CFR 112.7(e)(1)(ii))	NA	APPENDIX D	APPENDIX E	NA
AST SUPPORTS AND FOUNDATIONS (at integrity testing) (40 CFR 112.7(e)(2)(vi))	Bldg. 793	APPENDIX D	APPENDIX E	Integrity testing contractor
VISUAL INSPECTION OF ASTs (monthly) (40 CFR 112.7(e)(2)(vi))	Bldg. 793	APPENDIX D	APPENDIX E	Integrity testing contractors
BURIED PIPELINE (when exposed for any reason) (40 CFR 112.7(e)(3)(i))	NA	APPENDIX D	APPENDIX E	NA
ABOVEGROUND PIPELINES AND VALVES (monthly) (40 CFR 112.7(e)(3)(iv))	Bldg. 793	APPENDIX D	APPENDIX E	Integrity testing contractors

5.2.4.2. Testing

Tests required by 40 CFR 112.7(e) include regular pressure testing of aboveground storage tanks, periodic integrity testing of aboveground storage tanks, regular testing of liquid sensing devices on all bulk storage tanks, and periodic pressure testing of pipelines in areas where area drainage is such that a failure might lead to a spill event. The tests listed in Table 5.2-4 are conducted by this area.

Table 5.2-4

Tests Conducted by Air Traffic Control

TYPE (frequency) (regulation number)	TEST LOCATION	DOCUMENT WHERE WRITTEN PROCEDURE CAN BE FOUND	LOCATION OF TEST RECORDS	WHO PERFORMS TESTING
PRESSURE TESTING OF USTs (frequency) (40 CFR 112.7(e)(2)(iv))	NA	APPENDIX D	APPENDIX E	NA
INTEGRITY TESTING OF ASTs (annual) (40 CFR 112.7(e)(2)(vi))	Bldg. 793	APPENDIX D	APPENDIX E	Integrity testing contractors
TESTING OF PROPER OPERATION OF LIQUID SENSING DEVICES (annual) (40 CFR 112.7(e)(2)(viii)(E))	Bldg. 793	APPENDIX D	APPENDIX E	Integrity testing contractors
PRESSURE TESTING OF PIPELINES (frequency, and where warranted) (40 CFR 112.7(e)(3)(iv))	NA	APPENDIX D	APPENDIX E	NA

5.2.5. Security

All areas handling, processing, and storing oil or hazardous substances are fully fenced, and entrance gates are locked and/or guarded when the area is not in operation or is unattended.

The master flow and drain valves and other valves that permit direct outward flow of the tank's content to the surface are securely locked in the closed position when in non-operating or non-standby status. The starter control on all oil pumps is locked in the "off" position or located at a site accessible only to authorized personnel when the pumps are in a non-operating or non-standby status.

The loading/unloading connections of oil and hazardous substance pipelines are securely capped and blank-flanged when not in service or in standby service for an extended time. These security practices also apply to pipelines that are emptied of liquid content either by draining or by inert gas pressure.

Table 5.2-5 lists security measures in place at Air Traffic Control.

Table 5.2-5

Air Traffic Control Security Measures

TOPIC	DESCRIPTION
FENCING (of area or tanks)	Entire Installation is secured at all times
ENTRANCE GATES	Secured at all times
CONTROL OF VISITORS	Any visitors must receive clearance from NAS Security
SECURITY PATROLS (DAY) (other than normal installation patrol)	Roving patrol
SECURITY PATROLS (NIGHT) (other than normal installation patrol)	Roving patrol
VALVING CONTROL	Locked
LIGHTING:	none
OUT OF SERVICE PIPELINES OR TANKS	NA
OTHER	

5.2.6. Achieving Compliance

Table 5.2-6 identifies the areas of non-compliance known to exist at Air Traffic Control. The corrective action for each non-compliance issue is shown, as is the anticipated date of implementation of the corrective action.

Table 5.2-6

Compliance Schedule

NON-COMPLIANCE ISSUE	COMPLIANCE PLAN/CORRECTIVE ACTION	IMPLEMENTATION DATE
During refilling operations spill could reach sewer or storm drains	Ensure placing drain covers over these drains	Immediately

5.3. TEST CELL CENTER

5.3.1. General Area Information

General information on the area is provided in Table 5.3-1. This information includes the name of the area, responsible operator, type of area, year of initial operation, hours of operation, storage capacity and throughput, location, and designated person. An area diagram is provided in Figure 5.3-1. This figure shows the location of the storage and transfer equipment identified in this section in addition to the location of the control structures and the drainage flow directions.

Table 5.3-1

Area Information

AREA NAME		Test Cell Center
ALTERNATIVE NAMES (old, unofficial, etc.)		none
OPERATOR (dept., command, tenant, etc.)		Test Cell Center
TYPE OF AREA		provides storage of JP-5 fuel for jet engine
DESCRIPTION OF AREA		located on the south/southeastern side of building 1420
DATE OF INITIAL AREA OPERATION		unknown
HOURS/DAY NORMALLY ATTENDED		8
MAXIMUM OIL STORAGE CAPACITY		9,000 gal
MAXIMUM HAZARDOUS SUBSTANCE STORAGE CAPACITY		NA
NORMAL DAILY OIL THROUGHPUT		unknown
NORMAL DAILY HAZARDOUS SUBSTANCE THROUGHPUT		NA
ADDRESSES	MAILING	same as for facility
	PHYSICAL (if different)	
	Installation Grid Map #	EE-20
PHONE NUMBERS	24-HR	same as for facility
	DAY	same as for facility
	FAX	
DESIGNATED PERSON (Accountable for spill prevention) (Primary)	NAME	Mr. Mike Mitchell
	POSITION	SCE Code 18E
	WORK PHONE	(619) 123-4567
	24-HR PHONE	(619) 234-5678
DESIGNATED PERSON (Alternate)	NAME	NA
	POSITION	CDO Quarterdeck
	WORK PHONE	NA
	24-HR PHONE	(619) 345-6789

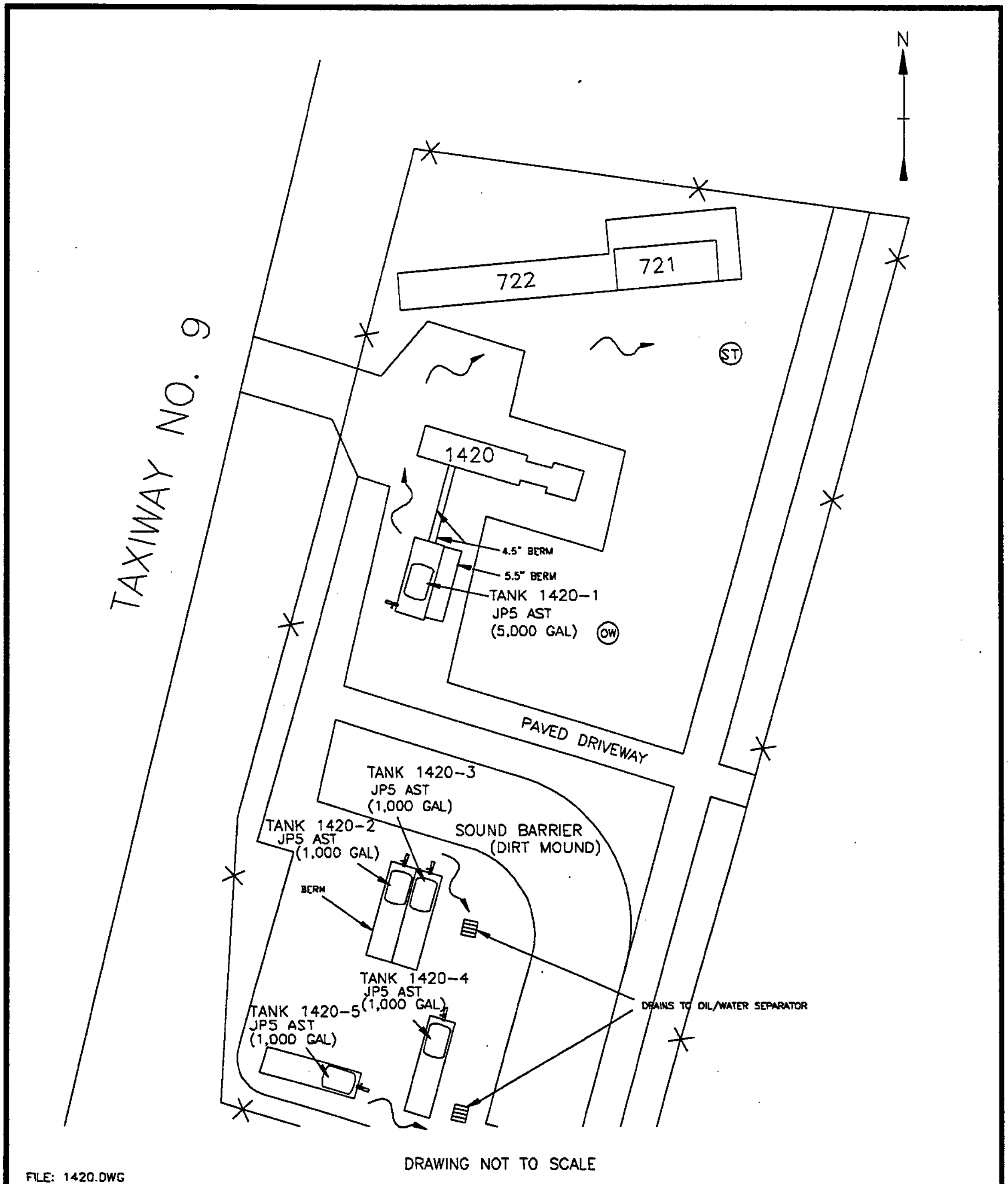


FIGURE 5.3-1
BUILDING #1420
TEST CELL CENTER
(S3A)
NAVAL AIR STATION
SPCC PLAN

LEGEND

- ABOVEGROUND STORAGE TANK
- EXPECTED SPILL DIRECTION
- FENCE
- OIL/WATER SEPARATOR
- STORM DRAIN
- DRAIN GRATE
- CLOSED DRAIN VALVE

5.3.2. Area Drainage

Table 5.3-2 presents the information pertaining to the drainage and drainage control structures of the area.

Table 5.3-2

Area Drainage

DRAINAGE SYSTEMS: TEST CELL CENTER		
TOPIC		INFORMATION
DRAINAGE CONTROL	FUNCTION OF DIKED AREAS	Tank farm
	DIVERSIONARY STRUCTURES	sound barrier constructed as a dirt mound acts to prevent fluid flow past drains and to block in noise
	LAGOONS OR CATCHMENT BASINS	
	LAGOONS OR CATCHMENT BASIN FLOODING POTENTIAL	
	SPILL CONTINGENCY PLAN OR COMMITMENT OF MANPOWER & EQUIPMENT	
DIKE STRUCTURES (if not covered in equipment specific tables)	TYPE	concrete walls around Tank 1420-1
	LINING	none
	DIMENSIONS	30'x15'x3'
	CALCULATED VOLUME (gal)	10,000
	DRAINAGE MECHANISM	manual open and close valve
	DRAINAGE PUMP CONTROL	manual after inspection
	DRAINAGE OUTFALL	ground outside dike, 125' to storm sewer
	DRAINAGE VALVE LOCKING	locked
	VISUAL INSPECTION SCHEDULE	inspected before draining
	LOCATION OF DIKE DRAINAGE RECORDS	Bldg. 1420
	OTHER:	
WATER TREATMENT UNIT	TYPE(S)	None
	FLOW BETWEEN TREATMENT UNITS	
	NUMBER OF LIFT PUMPS	
	FREQUENCY OF OPERATION	
	INSTALLATION	
	FAIL-SAFE PROVISIONS	
	OTHER:	
PLANT EFFLUENT	DISCHARGE POINT(S)	
	FREQUENCY OF OBSERVATION	

5.3.3. Aboveground Storage Tanks [Including Partially Buried Tanks]

This section includes the information required in 40 CFR 112.7(b) and 112.7(e)(2) and pertaining to aboveground storage tanks and partially buried storage tanks. This information is summarized in Table 5.3-3 and Table 5.3-4.

Table 5.3-3

Aboveground Storage Tanks

TANK INFORMATION: TEST CELL CENTER; TANK 1420-1		
TOPIC		INFORMATION
GENERAL INFORMATION	INSTALLATION MAP GRID #	EE-20
	NUMBER OF TANKS IN SET	1
	NOMINAL CAPACITY (gal)	5,000
	MATERIAL STORED	JP-5
	TANK MANUFACTURER/MODEL	Unknown
	YEAR INSTALLED	unknown
	TYPE TANK	AST
	CURRENT USE	fuels test cell generator
	CONDITION	good
PHYSICAL DESCRIPTION	COLOR PAINTED	silver
	MARKING FOR MATERIAL STORED	none
	DIMENSIONS	7'diameter x 25' length
	CONSTRUCTION/MATERIAL	welded steel compatible with contents
	SHAPE	horizontal cylinder with dike
SUPPORT	CONSTRUCTION	steel frame welded to tank
	SEISMIC/WIND ADEQUACY	adequate
CORROSION PROTECTION		painted
SECONDARY CONTAINMENT	TYPE	concrete walls
	LINING	none
	DIMENSIONS	30'x15'x3' (LxWxH)
	CALCULATED VOLUME (gal)	10,000
	DRAINAGE MECHANISM	manual open and close valve
	DRAINAGE OUTFALL	ground outside dike, 125' to storm sewer
	DRAINAGE VALVE LOCKING	locked
OVERFILL	FAIL-SAFE ENGINEERING	float indicator
	CATCHMENT	catch pan at AST fill port

Table 5.3-3 Cont.

Aboveground Storage Tanks

TANK INFORMATION: TEST CELL CENTER; TANK 1420-1		
TOPIC		INFORMATION
TANK HEATING		None
TANK MANIFOLDING		not manifolded
PIPING	MATERIAL	steel
	EXPOSURE	all aboveground
	SUPPORT DESIGN	minimizes abrasion and corrosion
	CORROSION PROTECTION	paint
	PROTECTION FROM VEHICLES	away from road
	CONTAINMENT	within dike
SECURITY	VALVES OPENING TO SURFACE	all locked
	PUMP STARTER CONTROLS	locked whenever off, in fenced area, inaccessible to unauthorized personnel
	LIGHTING	distant and general area lighting
	FIRE PROTECTION SYSTEM	none
MATERIAL SUPPLIER	NAME	unknown
	TRUCK PUMPING RATE (gpm)	est. 250
	PIPING DELIVERY RATE (gpm)	NA
INSPECTIONS AND TESTS	TANK INTEGRITY TESTING SCHEDULE	Annual leak test and 6 year internal inspection & cleaning
	VISUAL INSPECTION SCHEDULE	Tank receives monthly visual inspection.
PROBABILITY OF REACHING NAVIGABLE WATERS		medium
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	overfill via tank truck
	PREDICTION OF SPILL DIRECTION	north then east
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	rupture
	PREDICTION OF SPILL DIRECTION	north then east
	PREDICTION OF SPILL RATE OF FLOW	83.33 gpm
	PREDICTION OF TOTAL SPILL QUANTITY	5,000 gal
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	leakage
	PREDICTION OF SPILL DIRECTION	north then east
	PREDICTION OF SPILL RATE OF FLOW	0.50 gpm
	PREDICTION OF TOTAL SPILL QUANTITY	500 gal

Table 5.3-3 Cont.

Aboveground Storage Tanks

TANK INFORMATION: TEST CELL CENTER; TANK 1420-1		
TOPIC		INFORMATION
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	faulty piping, etc.
	PREDICTION OF SPILL DIRECTION	north then east
	PREDICTION OF SPILL RATE OF FLOW	3.47 gpm
	PREDICTION OF TOTAL SPILL QUANTITY	500 gal

Table 5.3-4

Aboveground Storage Tanks

TANK INFORMATION: TEST CELL CENTER; TANK 1420-2,3,4,5		
TOPIC		INFORMATION
GENERAL INFORMATION	INSTALLATION MAP GRID #	EE-20
	NUMBER OF TANKS IN SET	4
	NOMINAL CAPACITY (gal)	1,000 gal each
	MATERIAL STORED	JP-5
	TANK MANUFACTURER/MODEL	unknown
	YEAR INSTALLED	unknown
	TYPE TANK	AST
	CURRENT USE	fuels engine test cell
	CONDITION	excellent
PHYSICAL DESCRIPTION	COLOR PAINTED	yellow
	MARKING FOR MATERIAL STORED	none
	DIMENSIONS	4'diameter x 8' length
	CONSTRUCTION/MATERIAL	welded steel compatible with contents
	SHAPE	horizontal cylinder
SUPPORT	CONSTRUCTION	steel frame welded to tank
	SEISMIC/WIND ADEQUACY	adequate
CORROSION PROTECTION		painted
SECONDARY CONTAINMENT	TYPE	concrete walls
	LINING	none
	DIMENSIONS	20'x10'x8" (LxWxH)
	CALCULATED VOLUME (gal)	1,000
	DRAINAGE MECHANISM	manual open and close valve
	DRAINAGE OUTFALL	concrete pad outside berm to O/W separator
	DRAINAGE VALVE LOCKING	locked

Table 5.3-4 Cont.

Aboveground Storage Tanks

TANK INFORMATION: TEST CELL CENTER; TANK 1420-2,3,4,5		
TOPIC		INFORMATION
OVERFILL	FAIL-SAFE ENGINEERING	float indicator
	CATCHMENT	catch pan at AST fill port
TANK HEATING		none
TANK MANIFOLDING		not manifolded
PIPING	MATERIAL	steel
	EXPOSURE	all aboveground
	SUPPORT DESIGN	minimizes abrasion and corrosion
	CORROSION PROTECTION	paint
	PROTECTION FROM VEHICLES	posts
	CONTAINMENT	none
SECURITY	VALVES OPENING TO SURFACE	all locked
	PUMP STARTER CONTROLS	locked whenever off, in fenced area, inaccessible to unauthorized personnel
	LIGHTING	light at tanks, distant and general area lighting
	FIRE PROTECTION SYSTEM	none
MATERIAL SUPPLIER	NAME	unknown
	TRUCK PUMPING RATE (gpm)	est. 250
	PIPING DELIVERY RATE (gpm)	NA
INSPECTIONS AND TESTS	TANK INTEGRITY TESTING SCHEDULE	Annual leak test and 6 year internal inspection & cleaning
	VISUAL INSPECTION SCHEDULE	Tank receives monthly visual inspection.
PROBABILITY OF REACHING NAVIGABLE WATERS		negligible
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	overfill via tank truck
	PREDICTION OF SPILL DIRECTION	Southeast
	PREDICTION OF SPILL RATE OF FLOW	250 gpm
	PREDICTION OF TOTAL SPILL QUANTITY	250 gal
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	rupture
	PREDICTION OF SPILL DIRECTION	southeast
	PREDICTION OF SPILL RATE OF FLOW	50 gpm
	PREDICTION OF TOTAL SPILL QUANTITY	4,000 gal

Table 5.3-4 Cont.
Aboveground Storage Tanks

TANK INFORMATION: TEST CELL CENTER; TANK 1420-2,3,4,5		
TOPIC		INFORMATION
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	leakage
	PREDICTION OF SPILL DIRECTION	southeast
	PREDICTION OF SPILL RATE OF FLOW	0.50 gpm
	PREDICTION OF TOTAL SPILL QUANTITY	100 gal
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	faulty piping, etc.
	PREDICTION OF SPILL DIRECTION	southeast
	PREDICTION OF SPILL RATE OF FLOW	3.47 gpm
	PREDICTION OF TOTAL SPILL QUANTITY	100 gal

5.3.4. Oil/Water Separator

This section includes the information required by 40 CFR 112.7(b) and 112.7(e)(2) pertaining to oil/water separators. This information is summarized in Tables 5.3-5.

Table 5.3-5
Oil/Water Separators

OIL/WATER SEPARATOR INFORMATION: TEST CELL CENTER		
TOPIC		INFORMATION
GENERAL INFORMATION	NUMBER OF TANKS IN SET	1
	NOMINAL CAPACITY (gal)	1,000 gal
	MATERIAL STORED	JP-5/water
	TANK MANUFACTURER/MODEL	unknown
	YEAR INSTALLED	unknown
	TYPE TANK	UST
	CURRENT USE	oil/water separator
	CONDITION	unknown
PHYSICAL DESCRIPTION	CONSTRUCTION/MATERIAL	concrete/open top
	MARKING FOR MATERIALS STORED	none

Table 5.3-5 Cont.

Oil/Water Separators

OIL/WATER SEPARATOR INFORMATION: TEST CELL CENTER		
TOPIC		**INFORMATION**
SECONDARY CONTAINMENT	TYPE	none
	LINING	none
	DIMENSIONS	none
	CALCULATED VOLUME (gal)	NA
CORROSION PROTECTION		NA
TANK HEATING		none
PIPING	MATERIAL	none
	EXPOSURE	NA
	SUPPORT DESIGN	NA
	CORROSION PROTECTION	none
	PROTECTION FROM VEHICLES	none
	CONTAINMENT	none
SECURITY	VALVES OPENING TO SURFACE	NA
	PUMP STARTER CONTROLS	NA
	LIGHTING	general area lighting nearby
INSPECTIONS AND TESTS	TANK INTEGRITY TESTING SCHEDULE	regular pressure testing
	VISUAL INSPECTION SCHEDULE	NA
PROBABILITY OF REACHING NAVIGABLE WATERS		negligible
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	overflow
	PREDICTION OF SPILL DIRECTION	NA
	PREDICTION OF SPILL RATE OF FLOW	unknown
	PREDICTION OF TOTAL SPILL QUANTITY	unknown

5.3.5. Inspections and Tests

5.3.5.1. Inspections

40 CFR 112.7(e)(1)(ii) requires inspections for area drainage systems without treatment systems prior to discharge; these inspections are required to meet water quality objectives. In accordance with 40 CFR 112.7(e)(2)(vi), inspections and integrity testing of aboveground storage tanks is performed on a periodic basis along with frequent visual observations of the tanks for signs of deterioration or leaks. Buried pipelines are examined for corrosion each time they are exposed (40 CFR

112.7(e)(3)(i)). In accordance with 40 CFR 112.7(e)(3)(iv), aboveground pipelines and valves are also examined on a regular basis.

Inspections required by 40 CFR 112 are also in accordance with written procedures developed for the area. These written procedures are found in APPENDIX D. A record of the inspections, signed by the appropriate supervisor or inspector, is located in APPENDIX E of this SPCC Plan and is maintained for a period of at least three years. The inspections listed in Table 5.3-6 have been conducted at this area.

Pressure testing, but not inspections are required for USTs.

Table 5.3-6

Inspections Conducted by Test Cell Center

TYPE (frequency) (regulation number)	INSPECTION LOCATION	LOCATION WHERE WRITTEN PROCEDURE CAN BE FOUND	LOCATION OF INSPECTION RECORDS	WHO PERFORMS INSPECTIONS
ACCUMULATED RAIN WATER (before draining) (40 CFR 112.7(e)(1)(ii))	Bldg. 1420	APPENDIX D	APPENDIX E	Public Works Center
AST SUPPORTS AND FOUNDATIONS (at integrity testing) (40 CFR 112.7(e)(2)(vi))	Bldg. 1420	APPENDIX D	APPENDIX E	Integrity testing contractors
VISUAL INSPECTION OF ASTs (monthly) (40 CFR 112.7(e)(2)(vi))	Bldg. 1420	APPENDIX D	APPENDIX E	Integrity testing contractors
BURIED PIPELINE (when exposed for any reason) (40 CFR 112.7(e)(3)(i))	Bldg. 1420	APPENDIX D	APPENDIX E	Integrity testing contractors
ABOVEGROUND PIPELINES AND VALVES (monthly) (40 CFR 112.7(e)(3)(iv))	Bldg. 1420	APPENDIX D	APPENDIX E	Integrity testing contractors

5.3.5.2. Testing

Tests required by 40 CFR 112.7(e) include regular pressure testing of aboveground storage tanks, periodic integrity testing of aboveground storage tanks, regular testing of liquid sensing devices on all bulk storage tanks, and periodic pressure testing of pipelines in areas where area drainage is such that a failure might lead to a spill event. The tests listed in Table 5.3-7 are conducted by this area.

Table 5.3-7
Tests Conducted by Test Cell Center

TYPE (frequency) (regulation number)	TEST LOCATION	DOCUMENT WHERE WRITTEN PROCEDURE CAN BE FOUND	LOCATION OF TEST RECORDS	WHO PERFORMS TESTING
PRESSURE TESTING OF USTs (annual) (40 CFR 112.7(e)(2)(iv))	Bldg. 1420 Oil/Water Separator	APPENDIX D	APPENDIX E	Integrity testing contractor
INTEGRITY TESTING OF ASTs (annual) (40 CFR 112.7(e)(2)(vi))	Bldg. 1420	APPENDIX D	APPENDIX E	Integrity testing contractor
TESTING OF PROPER OPERATION OF LIQUID SENSING DEVICES (monthly) (40 CFR 112.7(e)(2)(viii)(E))	Bldg. 1420	APPENDIX D	APPENDIX E	Integrity testing contractor
PRESSURE TESTING OF PIPELINES (annual, and where warranted) (40 CFR 112.7(e)(3)(iv))	Bldg. 1420 pipelines leading to oil/water separator	APPENDIX D	APPENDIX E	Integrity testing contractor

5.3.6. Security

All areas handling, processing, and storing oil or hazardous substances are fully fenced, and entrance gates are locked and/or guarded when the area is not in operation or is unattended.

The master flow and drain valves and other valves that permit direct outward flow of the tank's content to the surface are securely locked in the closed position when in non-operating or non-standby status. The starter control on all oil pumps is locked in the "off" position or located at a site accessible only to authorized personnel when the pumps are in a non-operating or non-standby status.

The loading/unloading connections of oil and hazardous substance pipelines are securely capped and blank-flanged when not in service or in standby service for an extended time. These security practices also apply to pipelines that are emptied of liquid content either by draining or by inert gas pressure.

Area lighting is mercury vapor to: (A) aid in the discovery of spills occurring during hours of darkness, both by operating personnel, if present, and by non-operating personnel (the general public, local police, etc.) and (B) prevent spills occurring through acts of vandalism.

Table 5.3-8 lists security measures in place at Test Cell Center.

Table 5.3-8

Test Cell Center Security Measures

TOPIC	DESCRIPTION
FENCING (of area or tanks)	Entire Installation is secured at all times. The entire Test Cell Center is fenced.
ENTRANCE GATES	All gates are secured at all times
CONTROL OF VISITORS	Any visitors must receive clearance from NAS Security
SECURITY PATROLS (DAY) (other than normal installation patrol)	Roving patrol
SECURITY PATROLS (NIGHT) (other than normal installation patrol)	Roving patrol
VALVING CONTROL	Locked
LIGHTING:	distant and general area lighting, tanks 1420-2,3,4,5 have lights
OUT OF SERVICE PIPELINES OR TANKS	NA
OTHER	

5.3.7. Achieving Compliance

Table 5.3-9 identifies the areas of non-compliance known to exist at Test Cell Center. The corrective action for each non-compliance issue is shown, as is the anticipated date of implementation of the corrective action.

Table 5.3-9

Compliance Schedule

NON-COMPLIANCE ISSUE	COMPLIANCE PLAN/CORRECTIVE ACTION	IMPLEMENTATION DATE
No markings on tank 1420-1 to identify contents	Mark tank "Diesel Fuel"	Immediately

5.4. SPECIAL WEAPONS AREA

5.4.1. General Information

General information on the area is provided in Table 5.4-1. This information includes the name of the area, responsible operator, type of area, year of initial operation, hours of operation, storage capacity and throughput, location, and designated person. An area diagram is provided in Figure 5.4-1. This figure shows the location of the storage and transfer equipment identified in this section in addition to the location of the control structures and the drainage flow directions.

Table 5.4-1
Area Information

AREA NAME		Special Weapons Area
ALTERNATIVE NAMES (old, unofficial, etc.)		none
OPERATOR (dept., command, tenant, etc.)		Fire Protection, Special Weapons
TYPE OF AREA		day tank for a diesel emergency generator
DESCRIPTION OF AREA		located within building 812
DATE OF INITIAL AREA OPERATION		unknown
HOURS/DAY NORMALLY ATTENDED		8
MAXIMUM OIL STORAGE CAPACITY		40 gal
MAXIMUM HAZARDOUS SUBSTANCE STORAGE CAPACITY		NA
NORMAL DAILY OIL THROUGHPUT		unknown
NORMAL DAILY HAZARDOUS SUBSTANCE THROUGHPUT		NA
ADDRESSES	MAILING	same as for facility
	PHYSICAL (if different)	
	Installation Grid Map #	Z-30
PHONE NUMBERS	24-HR	same as for facility
	DAY	same as for facility
	FAX	
DESIGNATED PERSON (Accountable for spill prevention) (Primary)	NAME	Mr. Mike Mitchell
	POSITION	SCE Code 18E
	WORK PHONE	(619) 123-4567
	24-HR PHONE	(619) 234-5678
DESIGNATED PERSON (Alternate)	NAME	NA
	POSITION	CDO Quarterdeck
	WORK PHONE	NA
	24-HR PHONE	(619) 345-6789

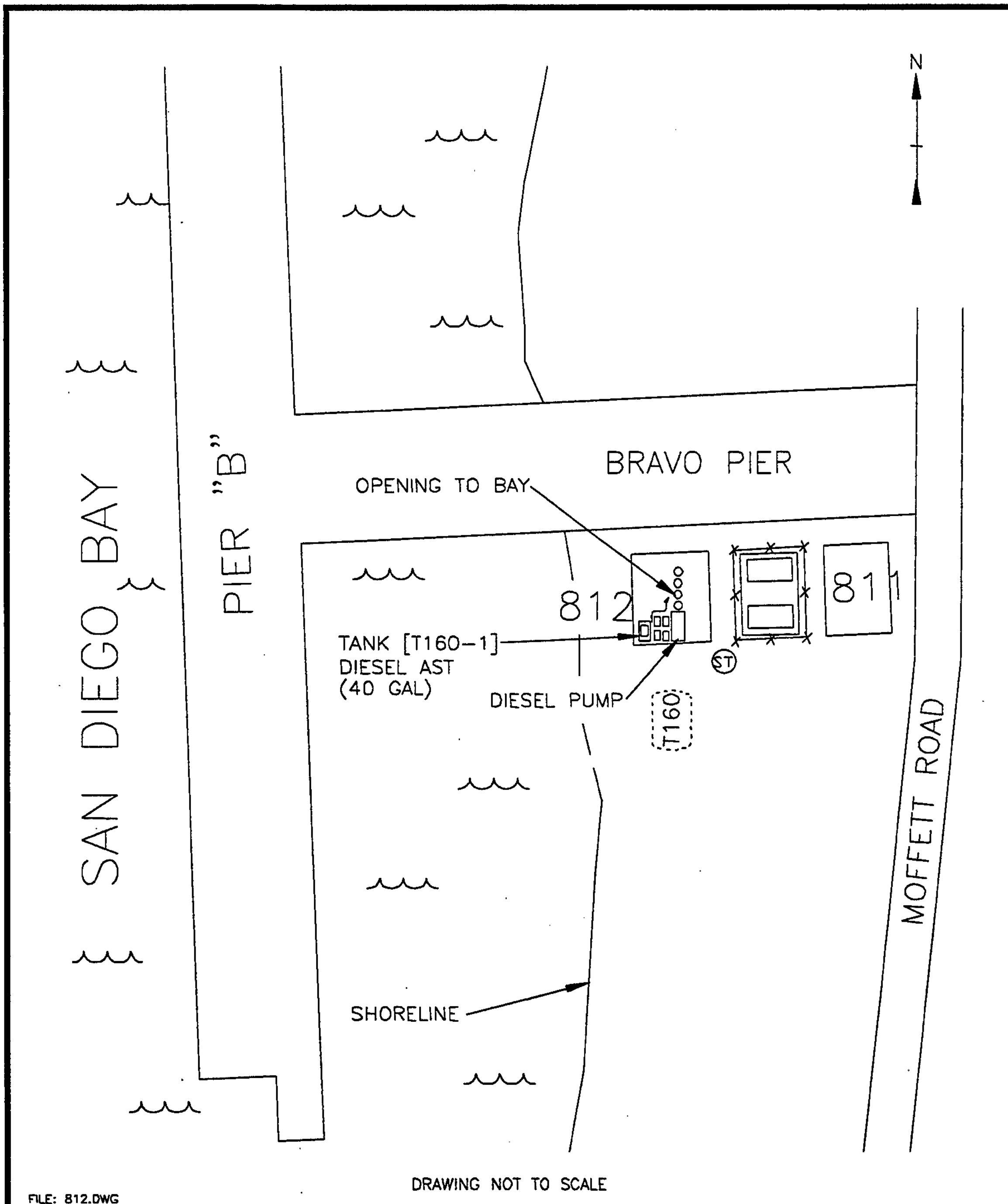


FIGURE 5.4-1
BUILDING #812
SPECIAL WEAPONS
FIRE PROTECTION
NAVAL AIR STATION
SPCC PLAN

LEGEND
- UNDERGROUND STORAGE TANK
- ABOVEGROUND STORAGE TANK
- EXPECTED SPILL DIRECTION
- ST STORM DRAIN
- FENCE

5.4.2. Area Drainage

There are no drainage control features contained within the Special Weapons Area. Drainage that could occur from a spill would flow directly into San Diego Bay through a floor opening.

5.4.3. Aboveground Storage Tanks [Including Partially buried Tanks]

This section includes the information required in 40 CFR 112.7(b) and 112.7(e)(2) and pertaining to aboveground storage tanks and partially buried storage tanks. This information is summarized in Table 5.4-2.

Table 5.4-2

Aboveground Storage Tanks

TANK INFORMATION: SPECIAL WEAPONS AREA (TANK T160-1)		
TOPIC		INFORMATION
GENERAL INFORMATION	INSTALLATION MAP GRID #	Z-30
	NUMBER OF TANKS IN SET	1
	NOMINAL CAPACITY (gal)	40
	MATERIAL STORED	Diesel
	TANK MANUFACTURER/MODEL	unknown
	YEAR INSTALLED	unknown
	TYPE TANK	AST
	CURRENT USE	long-term storage (day tank for emergency generator)
	CONDITION	good
PHYSICAL DESCRIPTION	COLOR PAINTED	grey
	MARKING FOR MATERIAL STORED	none
	DIMENSIONS	2'L x 1'W x 3'H
	CONSTRUCTION/MATERIAL	welded steel
	SHAPE	rectangular box
SUPPORT	CONSTRUCTION	steel
	SEISMIC/WIND ADEQUACY	adequate
CORROSION PROTECTION		Paint
SECONDARY CONTAINMENT	TYPE	none
	LINING	none
	DIMENSIONS	NA
	CALCULATED VOLUME (gal)	NA
	DRAINAGE MECHANISM	NA
	DRAINAGE OUTFALL	Tank is in shed (on pier) right over the beach
	DRAINAGE VALVE LOCKING	NA
OVERFILL	FAIL-SAFE ENGINEERING	unknown
	CATCHMENT	none

Table 5.4-2 Cont.
Aboveground Storage Tanks

TANK INFORMATION: SPECIAL WEAPONS AREA (TANK T160-1)		
TOPIC		INFORMATION
TANK HEATING		none
TANK MANIFOLDING		manifolded
PIPING	MATERIAL	steel
	EXPOSURE	aboveground as practical
	SUPPORT DESIGN	minimizes abrasion/corrosion
	CORROSION PROTECTION	paint
	PROTECTION FROM VEHICLES	away from road
	CONTAINMENT	double-walled pipe
SECURITY	VALVES OPENING TO SURFACE	NA
	PUMP STARTER CONTROLS	NA
	LIGHTING	general distant area lighting nearby
	FIRE PROTECTION SYSTEM	unknown
MATERIAL SUPPLIER	NAME	Trajen
	TRUCK PUMPING RATE (gpm)	NA
	PIPING DELIVERY RATE (gpm)	NA
INSPECTIONS AND TESTS	TANK INTEGRITY TESTING SCHEDULE	none
	VISUAL INSPECTION SCHEDULE	regular
PROBABILITY OF REACHING NAVIGABLE WATERS		certain
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	rupture
	PREDICTION OF SPILL DIRECTION	northeast to floor drain
	PREDICTION OF SPILL RATE OF FLOW	0.67 gpm
	PREDICTION OF TOTAL SPILL QUANTITY	40 gal
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	leakage
	PREDICTION OF SPILL DIRECTION	northeast to floor drain
	PREDICTION OF SPILL RATE OF FLOW	0.004 gpm
	PREDICTION OF TOTAL SPILL QUANTITY	4 gal
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	faulty piping, etc.
	PREDICTION OF SPILL DIRECTION	northeast to floor drain
	PREDICTION OF SPILL RATE OF FLOW	0.03 gpm
	PREDICTION OF TOTAL SPILL QUANTITY	4 gal

5.4.4. Inspections and Tests

5.4.4.1. Inspections

40 CFR 112.7(e)(1)(ii) requires inspections for area drainage systems without treatment systems prior to discharge; these inspections are required to meet water quality objectives. In accordance with 40 CFR 112.7(e)(2)(vi), inspections and integrity testing of aboveground storage tanks is performed on a periodic basis along with frequent visual observations of the tanks for signs of deterioration or leaks. Buried pipelines are examined for corrosion each time they are exposed (40 CFR 112.7(e)(3)(i)). In accordance with 40 CFR 112.7(e)(3)(iv), aboveground pipelines and valves are also examined on a regular basis.

Inspections required by 40 CFR 112 are also in accordance with written procedures developed for the area. These written procedures are found in APPENDIX D. Records of the inspections, signed by the appropriate supervisor or inspector, are located in APPENDIX E this SPCC Plan and are maintained for a period of at least three years. The inspections listed in Table 5.4-3 have been conducted at this area.

Pressure testing, but not inspections are required for USTs.

Table 5.4-3

Inspections Conducted by Special Weapons Area

TYPE (frequency) (regulation number)	INSPECTION LOCATION	LOCATION WHERE WRITTEN PROCEDURE CAN BE FOUND	LOCATION OF INSPECTION RECORDS	WHO PERFORMS INSPECTIONS
ACCUMULATED RAIN WATER (before draining) (40 CFR 112.7(e)(1)(ii))	NA	APPENDIX D	APPENDIX E	NA
AST SUPPORTS AND FOUNDATIONS (at integrity testing) (40 CFR 112.7(e)(2)(vi))	NA	APPENDIX D	APPENDIX E	NA
VISUAL INSPECTION OF ASTs (regular) (40 CFR 112.7(e)(2)(vi))	Bldg. 812	APPENDIX D	APPENDIX E	Facility Personnel
BURIED PIPELINE (when exposed for any reason) (40 CFR 112.7(e)(3)(i))	Bldg. 812	APPENDIX D	APPENDIX E	Facility Personnel
ABOVEGROUND PIPELINES AND VALVES (regular) (40 CFR 112.7(e)(3)(iv))	Bldg. 812	APPENDIX D	APPENDIX E	Facility Personnel

5.4.5. Security

All areas handling, processing, and storing oil or hazardous substances are fully fenced, and entrance gates are locked and/or guarded when the area is not in operation or is unattended.

Table 5.4-4 lists security measures in place at Special Weapons Area.

Table 5.4-4

Special Weapons Area Security Measures

TOPIC	DESCRIPTION
FENCING (of area or tanks)	The entire Special Weapons Area is fenced. Entire Installation is fenced
ENTRANCE GATES	Gates are secured at all times. Entire Installation is secured at all times.
CONTROL OF VISITORS	Any visitors must receive clearance from NAS Security
SECURITY PATROLS (DAY) (other than normal installation patrol)	Roving patrol of Installation
SECURITY PATROLS (NIGHT) (other than normal installation patrol)	Roving patrol of Installation
VALVING CONTROL	NA
LIGHTING:	general and distant area lighting nearby
OUT OF SERVICE PIPELINES OR TANKS	securely capped
OTHER	

5.4.6. Achieving Compliance

Table 5.4-5 identifies the areas of non-compliance known to exist at Special Weapons Area. The corrective action for each non-compliance issue is shown, as is the anticipated date of implementation of the corrective action.

Table 5.4-5

Compliance Schedule

NON-COMPLIANCE ISSUE	COMPLIANCE PLAN/CORRECTIVE ACTION	IMPLEMENTATION DATE
If Day Tank leaking occurred inside building 812, it would spill directly to San Diego Bay through a floor opening.	Seal opening between floor and water intake pipe.	Immediately

5.5. FUEL FARM TANKS 962 AND 963

5.5.1. General Area Information

General information on the area is provided in Table 5.5-1. This information includes the name of the area, responsible operator, type of area, year of initial operation, hours of operation, storage capacity and throughput, location, and

designated person. An area diagram is provided in Figure 5.5-1. This figure shows the location of the storage and transfer equipment identified in this section in addition to the location of the control structures and the drainage flow directions.

Table 5.5-1
Area Information

AREA NAME		Fuel Farm Tanks 962 and 963
ALTERNATIVE NAMES (old, unofficial, etc.)		none
OPERATOR (dept., command, tenant, etc.)		NAS Fuels Div/Trajen (contractor)
TYPE OF AREA		provides storage for JP-5
DESCRIPTION OF AREA		Tanks located within fuel farm
DATE OF INITIAL AREA OPERATION		1942
HOURS/DAY NORMALLY ATTENDED		8
MAXIMUM OIL STORAGE CAPACITY		500,000 gal
MAXIMUM HAZARDOUS SUBSTANCE STORAGE CAPACITY		NA
NORMAL DAILY OIL THROUGHPUT		unknown
NORMAL DAILY HAZARDOUS SUBSTANCE THROUGHPUT		NA
ADDRESSES	MAILING	same as for facility
	PHYSICAL (if different)	
	Installation Grid Map #	J-21
PHONE NUMBERS	24-HR	same as for facility
	DAY	same as for facility
	FAX	
DESIGNATED PERSON (Accountable for spill prevention) (Primary)	NAME	Mr. George Cook
	POSITION	Fuel Farm Director
	FAX PHONE	(619) 123-4567
	24-HR PHONE	(619) 234-5678
DESIGNATED PERSON (Alternate)	NAME	Mr. Mike Mitchell
	POSITION	SCE Code 18E
	WORK PHONE	(619) 345-6789
	24-HR PHONE	(619) 456-7890

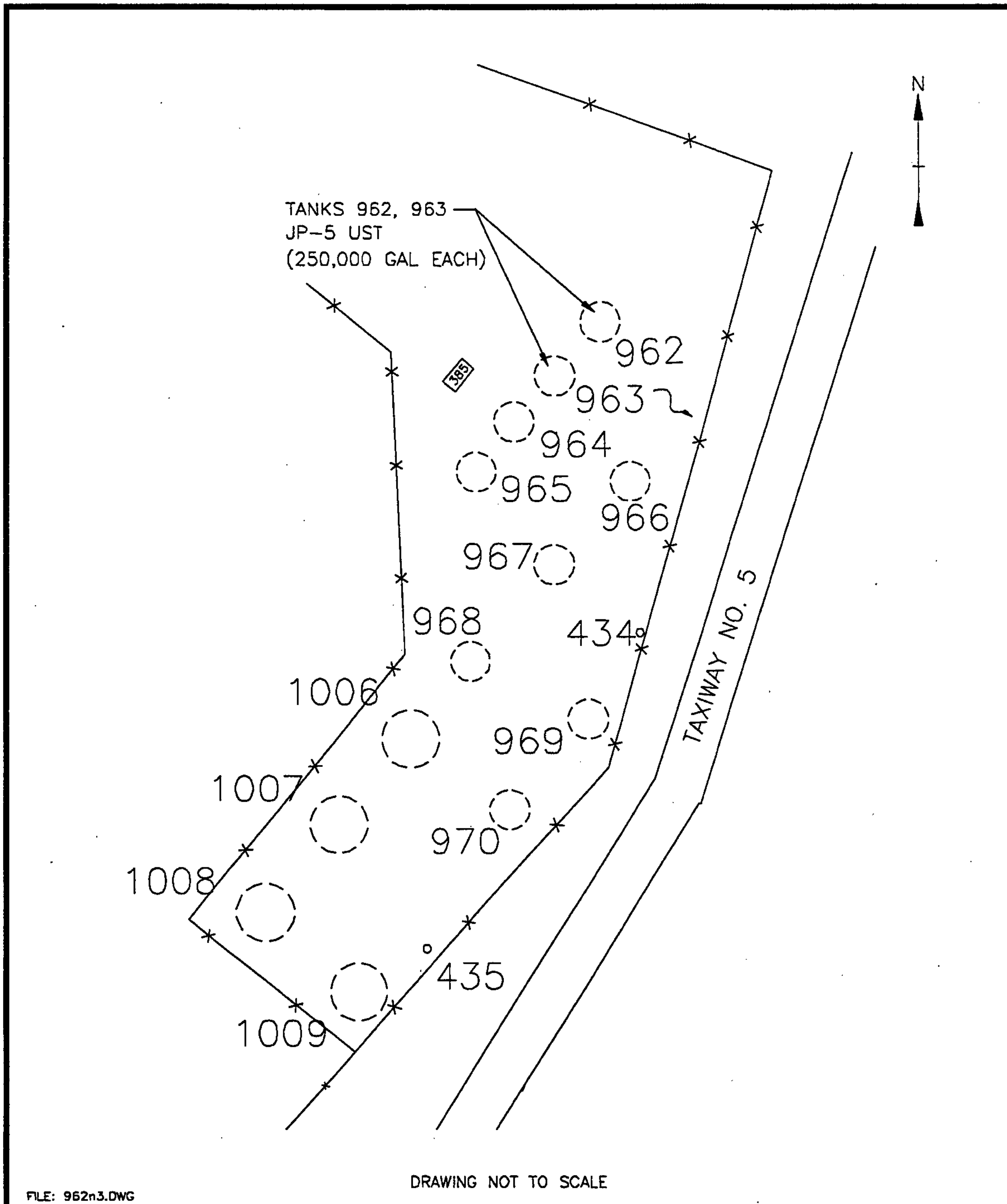


FIGURE 5.5-1
BUILDINGS #962, 963
FUEL FARM
NAVAL AIR STATION
SPCC PLAN

LEGEND

UNDERGROUND STORAGE TANK

EXPECTED SPILL DIRECTION

FENCE

5.5.2. Area Drainage

Table 5.5-2 presents the information pertaining to the drainage and drainage control structures of the area.

Table 5.5-2

Area Drainage

DRAINAGE SYSTEMS: FUEL FARM TANKS 962 AND 963		
TOPIC		INFORMATION
DRAINAGE CONTROL	FUNCTION OF DIKED AREAS	tank farm
	DIVERSIONARY STRUCTURES	
	LAGOONS OR CATCHMENT BASINS	loading/unloading racks
	LAGOONS OR CATCHMENT BASIN FLOODING POTENTIAL	no provisions made
	SPILL CONTINGENCY PLAN OR COMMITMENT OF MANPOWER & EQUIPMENT	all fueling trucks have spill kits readily available
DIKE STRUCTURES	TYPE	berms provided at all loading/unloading racks
	LINING	none
	DIMENSIONS	unknown
	CALCULATED VOLUME (gal)	unknown
	DRAINAGE MECHANISM	none
	DRAINAGE PUMP CONTROL	visually inspected
	DRAINAGE OUTFALL	none
	DRAINAGE VALVE LOCKING	none
	VISUAL INSPECTION SCHEDULE	NA
	LOCATION OF DIKE DRAINAGE RECORDS	Bldg. 429
	OTHER:	
WATER TREATMENT UNIT	TYPE(S)	None
	FLOW BETWEEN TREATMENT UNITS	
	NUMBER OF LIFT PUMPS	
	FREQUENCY OF OPERATION	
	INSTALLATION	
	FAIL-SAFE PROVISIONS	
	OTHER:	
PLANT EFFLUENT	DISCHARGE POINT(S)	
	FREQUENCY OF OBSERVATION	

5.5.3. Underground Storage Tanks

This section includes the information required by 40 CFR 112.7(b) and 112.7(e)(2) pertaining to underground storage tanks. This information is summarized in Tables 5.5-3.

Table 5.5-3

Underground Storage Tanks

TANK INFORMATION: FUEL FARM TANKS 962 AND 963		
TOPIC		INFORMATION
GENERAL INFORMATION	NUMBER OF TANKS IN SET	2
	NOMINAL CAPACITY (gal)	250,000 each
	MATERIAL STORED	JP-5
	TANK MANUFACTURER/MODEL	unknown
	YEAR INSTALLED	1942
	TYPE TANK	UST
	CURRENT USE	long term storage (temporarily out of service)
	CONDITION	may be leaking (under repair)
PHYSICAL DESCRIPTION	CONSTRUCTION/MATERIAL	concrete
	MARKING FOR MATERIALS STORED	acceptable
SECONDARY CONTAINMENT	TYPE	none
	LINING	none
	DIMENSIONS	unknown
	CALCULATED VOLUME (gal)	unknown
LEAK DETECTION	TYPE	none
	AUTOMATIC TANK GAGING	tested annually
	INVENTORY RECONCILIATION	none
CORROSION PROTECTION		none
OVERFILL	FAIL-SAFE ENGINEERING	float indicator, tape gauge, high level alarm - ATG, gauger/pumper visual and radio contact, computer
	CATCHMENT	none
TANK HEATING		none
TANK MANIFOLDING		manifolded
PIPING	MATERIAL	steel
	EXPOSURE	as aboveground as practical
	SUPPORT DESIGN	minimizes abrasion/corrosion
	CORROSION PROTECTION	cathodic protection
	PROTECTION FROM VEHICLES	valve pits
	CONTAINMENT	None

Table 5.5-3 Cont.
Underground Storage Tanks

TANK INFORMATION: FUEL FARM TANKS 962 AND 963		
TOPIC		INFORMATION
SECURITY	VALVES OPENING TO SURFACE	fenced facility
	PUMP STARTER CONTROLS	in fenced facility; inaccessible to unauthorized personnel
	LIGHTING	light at tank, general and distant area lighting nearby
MATERIAL SUPPLIER	NAME	U.S. Navy
	TRUCK PUMPING RATE (gpm)	NA
	PIPING DELIVERY RATE (gpm)	varies (1,084 max)
INSPECTIONS AND TESTS	TANK INTEGRITY TESTING SCHEDULE	regular integrity testing
PROBABILITY OF REACHING NAVIGABLE WATERS		high
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	overfill via tank truck
	PREDICTION OF SPILL DIRECTION	southeast
	PREDICTION OF SPILL RATE OF FLOW	250 gpm
	PREDICTION OF TOTAL SPILL QUANTITY	250 gal
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	overfill via piping
	PREDICTION OF SPILL DIRECTION	southeast
	PREDICTION OF SPILL RATE OF FLOW	NA
	PREDICTION OF TOTAL SPILL QUANTITY	1,084 gal
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	rupture
	PREDICTION OF SPILL DIRECTION	Southeast
	PREDICTION OF SPILL RATE OF FLOW	4166.67 gpm
	PREDICTION OF TOTAL SPILL QUANTITY	250,000 gal
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	leakage
	PREDICTION OF SPILL DIRECTION	southeast
	PREDICTION OF SPILL RATE OF FLOW	24.80 gpm
	PREDICTION OF TOTAL SPILL QUANTITY	25,000 gal

Table 5.5-3 Cont.
Underground Storage Tanks

TANK INFORMATION: FUEL FARM TANKS 962 AND 963		
TOPIC		INFORMATION
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	faulty piping, etc.
	PREDICTION OF SPILL DIRECTION	southeast
	PREDICTION OF SPILL RATE OF FLOW	173.61 gpm
	PREDICTION OF TOTAL SPILL QUANTITY	25,000 gal

5.5.4. Pipelines

This section should include all the information requested by 40 CFR 112.7(b) and 112.7(e)(3) pertaining to pipelines. This information is summarized in Table 5.5-4.

Table 5.5-4
Pipeline

PIPELINE INFORMATION: FUEL FARM TANKS 962 AND 963		
TOPIC		INFORMATION
GENERAL INFORMATION	NUMBER OF PIPELINES IN SET	unknown
	NOMINAL CAPACITY (gal)	1,084
	CONTENTS	JP-5
	YEAR INSTALLED	1942
	CURRENT USE	temporarily out of service
	CONDITION	may be leaking (under repair)
	DELIVERY RATE	varies (1,084 max)
PHYSICAL DESCRIPTION	COLOR PAINTED	unknown
	MARKINGS	adequate
	PIPELINE DIAMETER	unknown
	PIPELINE LENGTH	unknown
	CONSTRUCTION/MATERIAL	steel
	PIPELINE EXPOSURE	aboveground as practical
CORROSION PROTECTION	COATINGS	unknown
	CATHODIC PROTECTION	unknown
PIPE SUPPORT	CONSTRUCTION	prevents abrasion
	SEISMIC/WIND ADEQUACY	adequate
SECURITY	PROTECTION FROM VEHICLES	valve pits
	PUMP STARTER CONTROLS	in fenced facility; inaccessible to unauthorized personnel

Table 5.5-4 Cont.

Pipeline

PIPELINE INFORMATION: FUEL FARM TANKS 962 AND 963		
TOPIC		INFORMATION
SECONDARY CONTAINMENT	TYPE	none
	LINING	none
	DIMENSIONS	NA
	CALCULATED VOLUME (gal)	NA
	DRAINAGE MECHANISM	None
	DRAINAGE OUTFALL	none
	DRAINAGE VALVE LOCKING	none
LEAK DETECTION	TYPE	none
	AUTOMATIC TANK GAGING	
	INVENTORY RECONCILIATION	
INSPECTIONS AND TESTS	VISUAL INSPECTION SCHEDULE	regular integrity testing
PROBABILITY OF REACHING NAVIGABLE WATERS		high
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	overfill via piping
	PREDICTION OF SPILL DIRECTION	southeast
	PREDICTION OF SPILL RATE OF FLOW	NA
	PREDICTION OF TOTAL SPILL QUANTITY	1,084 gal

5.5.5. Tanker Truck Loading/Unloading Site

This section includes the information required by 40 CFR 112.7(b) and 112.7(e)(4) pertaining to tanker truck loading/unloading areas. This information is summarized in Table 5.5-5.

Table 5.5-5

Tanker Truck Loading/Unloading Site

TRUCK LOADING/UNLOADING SITE INFORMATION: NAME OF AREA (LOADING/UNLOADING SITE OR ID)		
TOPIC		INFORMATION
GENERAL INFORMATION	NUMBER OF RACKS OR BAYS	unknown
	CAPACITY OF LARGEST SINGLE TRUCK COMPARTMENT (gal)	250 gal
	MATERIAL TRANSFERRED	JP-5
	YEAR INSTALLED	1942
	CURRENT USE	temporarily out of service

Table 5.5-5 Cont.

Tanker Truck Loading/Unloading Site

TRUCK LOADING/UNLOADING SITE INFORMATION: NAME OF AREA (LOADING/UNLOADING SITE OR ID)		
TOPIC		INFORMATION
	MEETS DOT REQUIREMENTS	Yes
SECURITY	INTERLOCKED DEVICES	the air brakes of fuel trucks are locked during refueling to prevent premature drive-away
SECONDARY CONTAINMENT	TYPE	berming is provided at all loading/unloading racks
	LINING	none
	DIMENSIONS	unknown
	CALCULATED VOLUME (gal)	unknown
	DRAINAGE MECHANISM	none
	DRAINAGE OUTFALL	none
	DRAINAGE VALVE LOCKING	none
INSPECTIONS AND TESTS	LOWER MOST DRAINS AND OUTLETS	visually inspected
PROBABILITY OF REACHING NAVIGABLE WATERS		high
FAILURE ANALYSIS	POTENTIAL TYPE FAILURE	overfill via tank truck
	PREDICTION OF SPILL DIRECTION	southeast
	PREDICTION OF SPILL RATE OF FLOW	250 gpm
	PREDICTION OF TOTAL SPILL QUANTITY	250 gal

5.5.6. Inspections and Tests

5.5.6.1. Testing

Tests required by 40 CFR 112.7(e) include regular pressure testing of aboveground storage tanks, periodic integrity testing of aboveground storage tanks, regular testing of liquid sensing devices on all bulk storage tanks, and periodic pressure testing of pipelines in areas where area drainage is such that a failure might lead to a spill event. The tests listed in Table 5.5-6 are conducted by this area.

Test Conducted by Fuel Farm 962 and 963.

Table 5.5-6

Tests Conducted by Fuel Farm Tanks 962 and 963

TYPE (frequency) (regulation number)	TEST LOCATION	DOCUMENT WHERE WRITTEN PROCEDURE CAN BE FOUND	LOCATION OF TEST RECORDS	WHO PERFORMS TESTING
PRESSURE TESTING OF USTs (regular) (40 CFR 112.7(e)(2)(iv))	Bldg. 429	APPENDIX D	APPENDIX E	Tank integrity testing contractor
INTEGRITY TESTING OF ASTs (frequency) (40 CFR 112.7(e)(2)(vi))	NA	APPENDIX D	APPENDIX E	NA
TESTING OF PROPER OPERATION OF LIQUID SENSING DEVICES (regular) (40 CFR 112.7(e)(2)(viii)(E))	Bldg. 429	APPENDIX D	APPENDIX E	NAS Fuels Div. Will test annually during a regularly scheduled fuel delivery
PRESSURE TESTING OF PIPELINES (regular, and where warranted) (40 CFR 112.7(e)(3)(iv))	Bldg. 429	APPENDIX D	APPENDIX E	NAS Fuels Div.

5.5.7. Security

All areas handling, processing, and storing oil or hazardous substances are fully fenced, and entrance gates are locked and/or guarded when the area is not in operation or is unattended.

The loading/unloading connections of oil and hazardous substance pipelines are securely capped and blank-flanged when not in service or in standby service for an extended time. These security practices also apply to pipelines that are emptied of liquid content either by draining or by inert gas pressure.

Area lighting is mercury vapor to: (A) aid in the discovery of spills occurring during hours of darkness, both by operating personnel, if present, and by non-operating personnel (the general public, local police, etc.) and (B) prevent spills occurring through acts of vandalism.

Table 5.5-7 lists security measures in place at Fuel Farm Tanks 962 and 963.

Table 5.5-8

Fuel Farm Tanks 962 and 963 Security Measures

TOPIC	DESCRIPTION
FENCING (of area or tanks)	Entire Fuel Farm area is fenced with 8 ft. high fence with 3 strand barbed wire. Entire Installation is fenced
ENTRANCE GATES	There are six gates to this compound which are guarded at all times. Entire Installation is secured at all times.
CONTROL OF VISITORS	Any visitors must receive clearance from NAS Security
SECURITY PATROLS (DAY) (other than normal installation patrol)	Duty personnel patrol area. Roving patrol of Installation
SECURITY PATROLS (NIGHT) (other than normal installation patrol)	Duty personnel patrol area. Roving patrol of Installation
VALVING CONTROL	locked
LIGHTING:	light at tank, general and distant area lighting nearby
OUT OF SERVICE PIPELINES OR TANKS	securely capped
OTHER	

5.5.8. Achieving Compliance

Table 5.5-8 identifies the areas of non-compliance known to exist at Fuel Farm Tanks 962 and 963. The corrective action for each non-compliance issue is shown, as is the anticipated date of implementation of the corrective action.

Table 5.5-8

Compliance Schedule

NON-COMPLIANCE ISSUE	COMPLIANCE PLAN/CORRECTIVE ACTION	IMPLEMENTATION DATE
Tanks 962 and 963 do not have secondary containment	Recommend inspection for cathodic protection, overfill protection devices, and pipe leak detection tests as applicable. Either line tanks or replace tanks with double walled tanks	6 months

APPENDIX I
TANK MANAGEMENT PLAN

TANK MANAGEMENT PLAN GUIDANCE

The Navy's Environmental and Natural Resources Program Manual, OPNAVINST 5090.1B, requires all Naval activities with storage tanks to have a Storage Tank Management Plan. According to OPNAVINST 5090.1B, Storage Tank Management Plans are to contain a listing of all storage tanks at the activity, a discussion of the regulatory requirements for each tank, and a plan of action for achieving and maintaining compliance with the applicable regulations. OPNAVINST 5090.1B defines Tank Management Plans as activity-level documents that stress both aboveground and underground storage tank spill prevention planning, regulatory compliance, and record keeping. In using this guidance the template at the end of this section meets OPNAVINST 5090.1B.

1.1 TANK MANAGEMENT PLAN GUIDANCE SUMMARY

1. List all petroleum and hazardous substance storage tanks along with the regulatory requirements for each tank (See regulatory requirement section below). Whenever possible, the Tank Management Plan shall include aboveground storage tanks and all underground storage tanks including those that are exempt from the underground storage tank regulations.
2. Prepare a plan of action for achieving and maintaining compliance with all applicable regulatory requirements.
3. Prepare a detailed description of each storage tank including a discussion of features such as secondary containment, overfill prevention devices, and leak detection devices that have been installed to prevent and detect potential leaks and spills.
4. Prepare a listing and description of underground storage tanks that have been closed.
5. Prepare Standard Operating Procedures for tank maintenance and fuel deliveries.

1.2 REGULATORY REQUIREMENTS*

1.2.1 Exemptions in the Federal Underground Storage Tank Regulations

- Hazardous waste tanks (however hazardous waste tanks are regulated under RCRA Subtitle C, See 40 CFR 262.34(a)(1)(ii)
- In-ground hydraulic lift tanks
- Tanks less than 110 gallons

* Summary of underground tank requirements only.

- Wastewater treatment tanks (however, often regulated as part of an NPDES or pre-treatment wastewater permit)
- Oil/Water Separators (however, often regulated as part of a stormwater, NPDES, or pre-treatment wastewater permit)
- Wastewater holding tanks prior to discharge to municipal sewage treatment system (however, often regulated as part of a pre-treatment wastewater permit)
- Heating oil tanks on site use
- Used oil tanks prior to burning in an on-site space heater, furnace or boiler
- Tanks set upon or above floor of basements (these tanks may be considered as "aboveground tanks" for purposes of SPCC planning)

1.2.2 State Variations

Many state and local regulators have different and /or more stringent rules in some of the following areas:

- Secondary containment
- Compliance schedules
- Reporting requirements
- Clean up methods and criteria
- Reimbursement programs
- Regulation of heating oil and other federally exempt tanks

Check state and local rules for the latest requirements if any.

1.2.3 New USTs

When installing a new UST after December 22, 1988, the following actions must be taken:

- Certify that the tank and piping are installed properly according to industry codes using a state-certified installer.
- Equip the UST with spill and overfill devices and follow correct tank-filling procedures.
- Protect the tank and piping from corrosion.

1.2.4 Existing USTs

For USTs in existence on and before December 22, 1988, the following upgrade actions must be accomplished by no later than December 22, 1998 unless the tank is replaced or closed:

- Upgrade existing steel tanks by adding corrosion protection and/or an internal lining. Also, upgrade existing steel piping by adding corrosion protection.

- Install devices which prevent spills and overfills.

1.2.5 Heating Oil USTs

Even though, in most states, heating oil tanks are exempt from UST rules, known leaks usually must be reported and cleaned up and represent an added liability. Investigate unusual signs of leaks including a level or volume drop during long periods of nonuse such as during the summer.

1.2.6 Vehicle Lifts

Vehicle lifts with underground hydraulic oil storage are not covered by UST rules except in a few locations. Vehicle lift tanks are often neglected, resulting in subsurface contamination.

- Follow manufacturer's requirements for safe operation, maintenance and leak detection methods.
- Investigate unusually high oil consumption.
- Drain out-of-service equipment and properly dispose; oil could contain PCB chemicals.
- Consider use of biodegradable oil.

1.2.7 Leak Detection

EPA requires a method of leak detection be used for underground tanks and pipes. For tanks, these methods include:

- automatic tank gauging combined with inventory control;
- or vapor, groundwater or interstitial monitoring;
- or monthly inventory control together with tank tightness testing.

For underground tanks, inventory control combined with tank tightness testing can be used until 10 years after a tank is installed, upgraded, or replaced. After that a "monthly monitoring" leak detection method (such as automatic tank gauging or vapor, groundwater, and interstitial monitoring) must be used.

Pressurized underground piping must be equipped with an automatic line leak detector and must also be tightness tested annually or have a monthly monitoring leak detection method. Suction piping systems must be tightness tested every three years unless the piping system meets fail-safe design standards.

There are detailed requirements for installation, operation and maintenance of any leak detection method chosen.

1.2.8 Used Oil and Other Small USTs

Two special rules pertain to small underground tanks. USTs having a capacity of 550 gallons or less may use a manual tank gauging method as the sole method of leak detection. If allowed by state regulations, a modified manual tank gauging procedure

can be used as the sole method of leak detection for tanks up to 1000 gallons. For tanks with a capacity of 551 to 2,000 gallons, a manual gauging method may be used in place of an inventory-control method. The gauging method must meet the following requirements:

- Liquid level readings are taken before and after a 36-hour period where no liquid is added or removed from the tank.
- Readings are taken twice and averaged both at the beginning and end of the 36-hour period.
- The method used is capable of measuring the entire depth of the tank and can measure the level to the nearest 1/ 8 of a inch.

Using this method, a leak is suspected where the variation between the beginning and ending measurements exceeds the weekly (one test) or monthly (average of four tests) standards as follows:

Table 1-1
Suspected Leak Variations

Capacity (gallons)	Weekly test (one test)	Monthly average (average of four tests)
550 or less	10 gallons	5 gallons
551 to 1,000	13 gallons	7 gallons
1,001 to 2,000	26 gallons	13 gallons

Another special rule pertains to tanks which are filled by transfers of no more that 25 gallons at any one time; spill and overfill protection are not required to be installed on these tanks. These special rules pertain to petroleum and hazardous substance USTs, including used oil tanks, which meet the above criteria.

1.2.9 Release Reporting and Investigation

Reporting of all releases from UST systems is required, with few exceptions. The exceptions are:

- Spills and overfills of less that 25 gallons are not reportable, only if clean-up (including impacted soils) is completed within 24 hours. However, a release of any quantity of petroleum which causes a sheen upon surface waters must be reported to the National Response Center at 800-424-8802.
- Suspected releases which are investigated within 24 hours and found to be an unconfirmed release. However, if the suspected release was indicated from product inventory methods over a 30-day period, then a second month of data can be reviewed before reporting is required.

Some states do not allow these exceptions. Significant variation exists from state to state on reportable quantities and reporting times.

- An indication of a potential tank leak includes:
- Unusual operating conditions at the dispensers
- Pipe leak detector trips
- Leak detection system indication
- Measured volumetric gain due to water infiltration
- Product loss indication from inventory-control methods
- Observed loss of product due to a spill or leak

1.2.10 Confirmed Releases

If a leak is confirmed, follow these requirements:

- Take immediate action to stop and contain the leak or spill. For example
  1. Shut down the system
  2. Pump down the tank
  3. Absorb free product on the surface.
  4. Set out absorbent booms to prevent product from entering a storm sewer or surface water.
  5. If fuel has reached surface water, the proper person must report this to a spill response team and to all appropriate government authorities immediately.
- The confirmed release must be reported to the state UST agency within 24 hours or other required reporting time.

1.2.11 Initial Site Characterization

Where a release has been confirmed, detailed information must be assembled about the nature of the release and the location. Within a reasonable time period, generally specified as 45 days, the above information must be submitted in a written report to the UST agency.

1.2.12 Soil and Groundwater Investigations and Corrective Action

Upon confirmation of a release, it is required to conduct a soil and/or groundwater investigation (subsurface assessment) to determine the full impact of the release on the surrounding soils and groundwater. In some cases, these investigations may span several months and consist of more than one or two phases of investigation. Soil and groundwater investigations should be conducted only by qualified geologists or hydrogeologists with specific experience in environmental assessments around USTs. If contaminated soils and groundwater exceed the state action levels, soil and groundwater cleanup will be required.

1.2.13 Temporary and Permanent Closure

EPA rules allow the temporary closure of a UST system, which has not been upgraded, for up to 12 months before requiring a permanent closure. Upgraded USTs may be temporarily closed for an indefinite period of time. In many states and local areas, either the UST agency or the fire department will require permanent closure in as few as 90 to 180 days.

Where a permanent closure of a UST system is planned, the following is required:

- Notify the UST agency 30 days prior to permanent closure.
- Determine if past releases have impacted soils and groundwater. If there is contamination above the state action level, corrective action may be necessary.
- If a decision is made to close a UST in place, and it is allowable by the state and local jurisdictions, a site assessment must first be conducted. If contamination warrants corrective action, tank removal may be necessary and most cost effective.

1.2.14 Tank Removal

Removal of UST systems should follow American Petroleum Institute (API) 1604 or other recommended practices. Tank removal contractors may be required to have licenses or certification from the state. Most states have written closure requirements. The contract with the tank removal company should require it to follow state rules. A closure analysis must be conducted by taking soil and water samples from pipe runs and tank excavation pits and having the samples analyzed. Dispose of the tank, and dispose or treat contaminated soils and wastes in accordance with the state requirements.

1.2.15 Record Keeping

It is impossible to demonstrate compliance with the UST regulations unless the appropriate records are kept. Under the UST regulations, the following records must be maintained:

- Documentation of the operation of cathodic protection equipment
- Records on all UST repairs
- Recent compliance with leak detection requirements including monthly inventory reconciliations, monitoring well data, tightness test results and printouts from automatic leak detection systems
- Performance claims and maintenance and calibration of leak detection systems
- Results of site investigation at permanent closure
- Proof of financial responsibility
- Spill reports

Record retention requirements vary up to 5 years. However, it is recommended most records be maintained indefinitely.

MINIMUM REQUIREMENTS

Table 1-2
Leak Detection

LEAK DETECTION	
NEW TANKS *2 Choices*	• Monthly monitoring* • Monthly Inventory Control and Tank Tightness Testing Every 5 Years (You can only use this choice for 10 years after installation.)
EXISTING TANKS *3 Choices*	• Monthly monitoring* • Monthly Inventory Control and Annual Tank Tightness Testing (This choice can only be used until December 1998.) • Monthly Inventory Control and Tank Tightness Testing Every 5 Years (This choice can only be used for 10 years after adding corrosion protection and spill/overfill prevention or until December 1998, whichever date is later.)
NEW & EXISTING PRESSURIZED PIPING *Choice of one from each set*	• Automatic Flow Restrictor • Automatic Shutoff Device • Continuous Alarm System and • Annual Line Testing • Monthly Monitoring*
NEW & EXISTING SUCTION PIPING *3 Choices*	• Monthly Monitoring*(except for automatic tank gauging) • Line Testing Every 3 Years • No Requirements (If the system has the characteristics of- 1. Suction piping sloped back to tank 2. Only one check valve directly below suction pump)

*Monthly Monitoring Includes:
- Automatic Tank Gauging
- Vapor Monitoring
- Interstitial Monitoring
- Ground Water Monitoring
- Other Approved Methods.

Table 1-3
Corrosion Protection

CORROSION PROTECTION	
NEW TANKS *3 Choices*	• Coated and Cathodically Protected Steel • Fiberglass • Steel Tank Clad with Fiberglass
EXISTING TANKS *4 Choices*	• Same Options as for New Tanks • Add Cathodic Protection System • Interior Lining • Interior Lining and Cathodic Protection

NEW PIPING *2 Choices*	• Coated and Cathodically Protected Steel • Fiberglass
EXISTING PIPING *2 Choices*	• Same Options as for New Piping • Cathodically Protected Steel

Table 1-4
Spill/Overfill Prevention

SPILL/OVERFILL PREVENTION		
ALL TANKS	• Catchment Basins and	• Automatic Shutoff Devices or • Overfill Alarms or • Ball Float Valves

COMPLIANCE SCHEDULE

Table 1-5
Schedule for Compliance

TYPE OF TANK & PIPING	LEAK DETECTION	CORROSION PROTECTION	SPILL/OVERFILL PREVENTION
New Tanks and Piping*	At installation	At installation	At installation
Existing Tanks** 25+ or unknown age 20 - 24 years 15 -19 years 10 - 14 years Under 10 years	December 1989 December 1990 December 1991 December 1992 December 1993	December 1998	December 1998
Existing Piping** Pressurized Suction	December 1990 Same as existing tanks	December 1998 December 1998	Does not apply

*New tanks and piping are those installed after December 1988.

**Existing tanks and piping are those installed before December 1988.

IF YOU CHOOSE TANK TIGHTNESS TESTING AT EXISTING USTS

If you don't use monthly monitoring at existing USTs, you must use a combination of periodic tank tightness tests and monthly inventory control. This combined method can only be used for a few years, as the chart below displays.

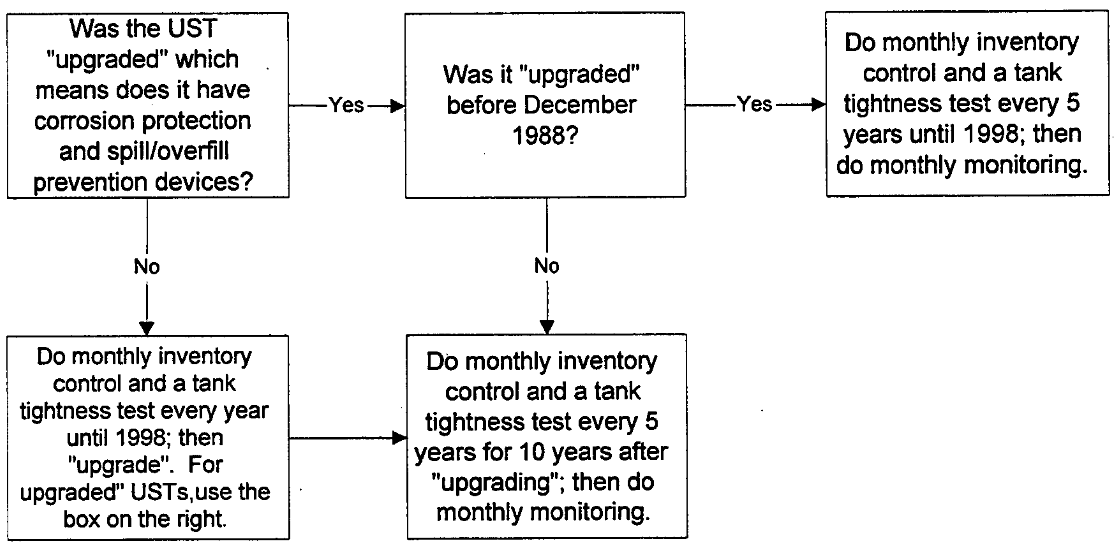


Figure 1-1
Tank Tightness Testing

SAMPLE TANK SUMMARY TEMPLATE

The following template shows how the template can be used to summarize the listing of tanks.

Table 1-6
TANK SUMMARY: Activity Name

FACILITY	USE	TANK ID#	NOMINAL CAPACITY (gal)	TYPE TANK AST or UST	APPLICABLE REGULATIONS
NEX Gas Station	Unleaded Gasoline Storage	NEX-1	25,000 gal	UST	UST SPCC
NEX Gas Station	Premium Unleaded Gasoline Storage	NEX-2	25,000 gal	UST	UST SPCC
Admin Building	Heating Oil Storage	Adm- 1	5000 gal	UST	None
TELCOM Building	Diesel Storage for Emergency Generator	TELCOM -1	5000 gal	UST	UST
Boat Pier	Diesel Fuel Storage for Fueling Tugboats	Pier-1	8000 gal	AST	SPCC
Boat Pier	Diesel Fuel Storage for Fueling Tugboats	Pier-2	8000 gal	AST	SPCC
Auto Hobby Shop	Oil/Water Separator	O/W-1	650 gal	O/W Sep	Stormwater Permit

SAMPLE TANK INFORMATION TEMPLATE

This template summarizes tank information and plan of action to achieve compliance.

Table 1-7
Building # - Building Name

TOPIC		INFORMATION
TANK INFORMATION	NUMBER OF TANKS	
	TANK REGISTRATION NUMBER(S)	
	NOMINAL CAPACITY (gal)	
	CONTENTS	
	INSTALLATION INFORMATION	
	CURRENT USE	
	DESCRIPTION OF TANK	(Note - Include the following information: AST or UST, Material of Construction, Double or Single Walled, Manufacturer, etc.)
	CORROSION PROTECTION &/OR TANK LINING	
	LEAK DETECTION &/OR TANK GAUGING SYSTEMS	
SPILL/OVERFILL PREVENTION	OVERFILL PREVENTION DEVICES	
	SPILL CATCHMENT BASIN	
PIPING	DESCRIPTION/DIMENSIONS	(Note - Include whether aboveground or underground, material of construction, and whether double or single walled.)
	TYPE OF PUMPING SYSTEM	
	LEAK DETECTION	
OPERATION (Note - Describe any required on-going actions and identify who will conduct each action._)	TANK FILLING	
	INVENTORY CONTROL AND LEAK DETECTION	
	EQUIPMENT CALIBRATION AND MAINTENANCE	
	TANK AND/OR LINE TESTING	
	CATHODIC PROTECTION SYSTEM TESTING	
	REPORTING OF SPILLS AND LEAKS	
	RECORDKEEPING	
	NOTIFICATION AND PERMIT REQUIREMENTS	
FUTURE PROJECTS	UPCOMING REPAIR,	

OR REQUIREMENTS	UPGRADE, AND REPLACEMENT PROJECTS	
	CLOSURE REQUIREMENTS	
	SITE CHARACTERIZATION AND CLEANUP PROJECTS	
SITE HISTORY	LOCATION OF PERMANENT RECORDS AND REFERENCED REPORTS	
	HISTORY OF PAST TESTS (tank and piping test, cathodic protection tests)	
	HISTORY OF TANK OPERATIONS (repair, replacements, use changes, etc.)	
	PAST LEAKS/SPILLS (description and actions taken)	

This is a blank template for tank summary.

Table 1-8
TANK SUMMARY: Activity Name

FACILITY	USE	TANK ID#	NOMINAL CAPACITY (gal)	TYPE TANK AST or UST	APPLICABLE REGULATIONS

	Figure 1-2 **Figure X.X: Building X - Building Name**

APPENDIX J

APRIL 29, 1992 EPA MEMORANDUM

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 29 [illegible]

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

MEMORANDUM

SUBJECT: Use of Alternative Secondary Containment Measures at Facilities Regulated under the Oil Pollution Prevention Regulation (40 CFR Part 112)

FROM: Don R. Clay
Assistant Administrator

TO: Director, Environmental Services Division
Regions I, VI, VII
Director, Emergency and Remedial Response Division
Region II
Director, Hazardous Waste Management Division
Regions III, IX
Director, Waste Management Division
Regions IV, V, VIII
Director, Hazardous Waste Division
Region X

PURPOSE

This memorandum addresses the U.S. Environmental Protection Agency's (EPA) interpretation of the term "secondary containment" as it is used in section 112.7(c) of the Oil Pollution Prevention regulation (40 CFR Part 112), also known as the Spill Prevention, Control and Countermeasures (SPCC) regulation. It also addresses technologies that may be used to provide secondary containment for smaller, shop-fabricated aboveground storage tanks (ASTs) consistent with 40 CFR Part 112.7(c).

BACKGROUND

Since 1973, the SPCC regulation has included the following provision addressing secondary containment and the allowance for equivalent preventive systems. Section 112.7(c) states:

> Appropriate containment and/or diversionary structures or equipment to prevent discharged oil from reaching a navigable water course should be provided. One of the following preventive systems or its equivalent should be

used as a minimum: (1) Onshore facilities: (i) Dikes, berms or retaining walls sufficiently impervious to contain spilled oil; (ii) Curbing; (iii) Culverting, gutters or other drainage systems; (iv) Weirs, booms or other barriers; (v) Spill diversion ponds; (vi) Retention ponds; (vii) Sorbent materials.

The SPCC regulation implements Section 311(j)(1)(C) of the Clean Water Act (CWA) for non-transportation-related facilities. In 1988, the Agency published regulations at 40 CFR Part 280 for underground storage tanks (USTs) implementing the requirements of Subtitle I of the Resource Conservation and Recovery Act. An apparent result of the implementation of the UST regulation is a trend of facilities replacing USTs with ASTs.

In response to this trend, tank manufacturers have developed various new designs for shop-fabricated AST systems. Alternative AST systems for which we have information generally do not exceed 12,000 gallons capacity. Some of these new designs include a steel or reinforced concrete secondary shell fully encasing a storage tank; others include an attached, shop-fabricated containment dike. Many other system designs may also be available. Typically, these alternative AST system designs provide containment for the entire capacity of the inner tank for spills resulting from leaks or ruptures of the inner tank.

In 1988, EPA noted in its Oil SPCC Program Task Force Report that the Agency has limited inspection resources to implement the SPCC program. Less than 1,000 of the estimated half million SPCC-regulated facilities are inspected by EPA annually. Moreover, section 311 of the CWA does not permit EPA to delegate this program to the States. The Task Force, therefore, recommended that EPA attempt to target these very limited resources to inspecting the highest-risk facilities. In general, we believe that facilities using smaller-volume AST systems generally pose less risk than larger field-erected tanks and tank farms of large uncontrolled spills reaching navigable waters, especially if these facilities are not located near sensitive ecosystems or water supply intakes.

The traditional method of providing secondary containment for ASTs has been to construct dikes, berms, retaining walls and/or diversion ponds to collect oil once it spills. Based on the experience of EPA Regional personnel implementing the SPCC regulation since 1973, these traditional means of secondary containment are very effective and reliable methods of protecting the surface waters from oil spills from ASTs. However, the SPCC regulation is a performance-based regulation that permits facility owners or operators to substitute alternative forms of spill containment if they provide protection against discharges to navigable waters substantially equivalent to that provided by the systems listed in section 112.7(c).

Consistent with section 112.1(e) of the SPCC regulation, this memorandum does not supersede the authority of "existing laws, regulations, rules, standards, policies and procedures pertaining to safety standards, fire prevention and pollution rules," including fire codes or other standards for good engineering practice that may apply to alternative AST systems.

On October 22, 1991, EPA proposed revisions to the SPCC regulation. The proposed revisions do not affect the provisions of section 112.7(c) that describe alternative systems that are substantially equivalent to those specifically listed in paragraphs (c)(1)(i) through (c)(1)(vii).

OBJECTIVE

This memorandum should allow EPA Regional personnel to provide consistent interpretation of the secondary containment provisions of section 112.7(c) of the SPCC regulation to facilities with generally smaller shop-fabricated ASTs. Alternative AST systems, including equipment and procedures to prevent reasonably expected discharges, should satisfy the secondary containment provisions of the SPCC regulation under most site-specific conditions.

DISCUSSION

As smaller shop-fabricated ASTs are increasingly appearing in the market, we have observed a number of innovative technologies to reduce the risks of both leaks and spills. Moreover, these smaller shop-fabricated tanks do not pose the same risk of large uncontrolled oil spills to navigable waters as the larger field-erected tanks. Therefore, we believe that there should be many situations in which protection of navigable waters substantially equivalent to that provided by the secondary containment systems listed in section 112.7(c) could be provided by alternative AST systems that have capacities generally less than 12,000 gallons and are installed and operated with protective measures other than secondary containment dikes. For example, some State programs provide an exemption from State spill prevention requirements for ASTs with similar capacities. However, in certain situations, these alternative AST systems might appropriately not be presumed to comply with the provisions of section 112.7(c). An example of this type of situation is facilities containing four or more ASTs or ASTs with combined capacity greater than 40,000 gallons, where a number of larger tanks are connected by manifolds or other piping arrangements

that would permit a volume of oil greater than the capacity of one tank to be spilled as a result of a single system failure.[1]

The owner or operator of any facility subject to the SPCC regulation, including facilities using alternative AST systems, must adhere to all applicable provisions of the SPCC regulation. The owner or operator of each regulated facility must develop a site-specific SPCC Plan that must be certified by a Registered Professional Engineer as required by section 112.3 of the regulation. Pursuant to the requirement of section 112.7 that the SPCC Plan shall "include a discussion of the facility's conformance with the appropriate guidelines listed," a complete SPCC Plan for any facility using alternative AST systems should include a discussion of why the facility is considered to be in conformance with section 112.7(c).

In evaluating these shop-fabricated AST systems, EPA's Office of Solid Waste and Emergency Response (OSWER) has looked at requirements the Agency has established for tanks in situations where traditional secondary containment systems cannot be provided (e.g., USTs covered by 40 CFR Part 280). Additionally, OSWER has evaluated relevant State and local government requirements. OSWER also has considered factors related to alternative AST systems, including tank size, typical pumping rates used to fill and empty them, and the lower risk of large, uncontrolled oil spills from facilities using such AST systems, based on tank size, design, and pumping rates. We believe that for these smaller shop-fabricated ASTs some alternative AST systems that include adequate technical spill and leak prevention options such as overfill alarms, flow shutoff or restrictor devices, and constant monitoring of product transfers generally would allow owners and operators of facilities to provide protection of navigable waters substantially equivalent to that provided by secondary containment as defined in 40 CFR Part 112.7(c). For example, small double walled ASTs, when used with equipment and procedures described in this guidance, generally would provide substantially equivalent protection of navigable waters under section 112.7(c) of the SPCC regulation when the inner tank is an Underwriters' Laboratory-listed steel tank, the outer wall is constructed in accordance with nationally accepted industry standards (e.g., those codified by the American Petroleum Institute, the Steel Tank Institute, and American Concrete Institute), the tank has overfill prevention measures that include an overfill alarm and an automatic flow restrictor

[1] This is based on similar capacities in proposed National Fire Protection Association standards and consideration of the risks to public health or welfare or the environment of spills of potentially larger size.

or flow shut-off,[2] and all product transfers are constantly monitored.[3]

CONCLUSION

When the only significant source of potential oil spills to navigable waters of the United States from a facility is from alternative ASTs as described in this memorandum, an SPCC Plan that is certified by a Registered Professional Engineer and that requires equipment and operating practices in accordance with good engineering practice and the principle of substantial equivalence as described above should be presumed to achieve the protection of navigable waters substantially equivalent to that provided by the preventive systems specified in 40 CFR Part 112.7(c).

cc: Bowdoin Train
Henry Longest
Bruce Diamond
Deborah Dietrich
Walter Kovalick
James Makris
Charles Openchowski
David Ziegele
Wendy Butler
Removal Managers, Regions I-X

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[2] Consistent with the performance standards for these devices as described in section 280.20(c) of EPA regulations for USTs at 40 CFR Part 280 and in an August 5, 1991, amendment, an automatic flow shut-off will shut off flow so that none of the fittings located on top of the tank are exposed to product as a result of overfilling, an automatic flow restrictor will restrict flow 30 minutes prior to overfill or when the tank is no more than 90 percent full, and a high level alarm will alert the operator one minute before overfilling or when the tank is no more than 90 percent full.

[3] Consistent with the performance standard for overfill control as described in section 280.30(a) of EPA regulations for USTs at 40 CFR Part 280, an owner/operator of the facility will ensure that the transfer operation is monitored constantly to prevent overfilling and spilling.

APPENDIX K
SPILL PREVENTION TRAINING

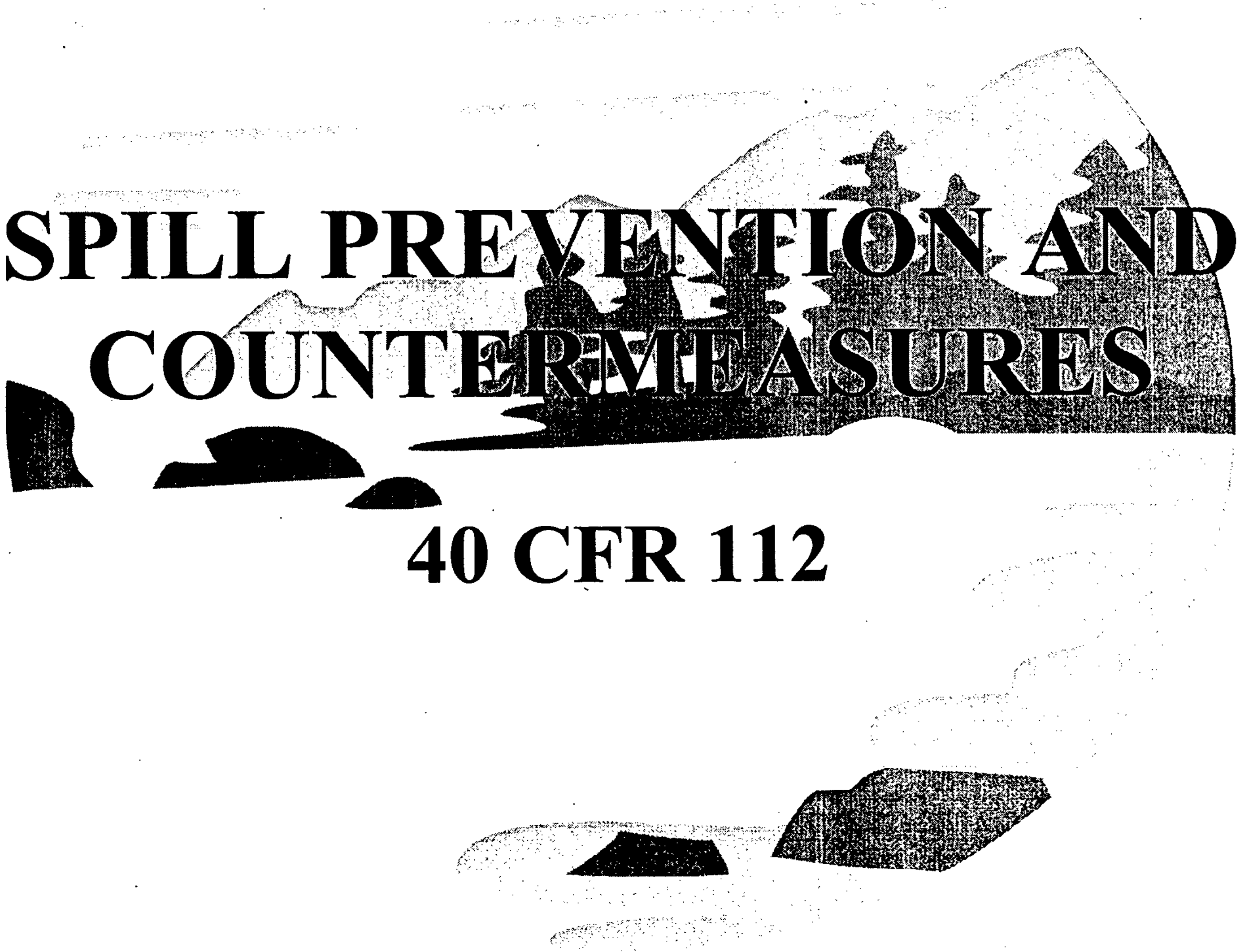
SPCC TRAINING SYLLABUS

An important contribution to the development of SPCC planning is spill prevention training for facility operators and managers. The primary intent of SPCC training is to educate personnel on the purpose, site applicability, regulatory intent, operational requirements, inspection procedures and response mechanisms that embodies a well organized spill planning and response program. The overheads presented in this course will meet the intent of this training in addition to providing site specific details that facility operators and managers require in their daily implementation of spill prevention planning. By the end of this course, the student will be aware of the relationship between their daily activities and spill prevention.

The following outline is a rough breakdown of the material contained within this course. This material may be modified for your particular area training, but serves to cover the general intent of SPCC training for all facility personnel.

- Introduction
- Purpose
- Applicability
- Regulatory Set-Up
- Area Descriptions
- Operational Requirements
- Spill Response
- Inspections
- Drum Storage
- Anatomy of a Spill
- Tank Coordinator Responsibilities
- CNB Responsibilities
- In Case of a Spill
- Closing Statements
- Questions & Answers

SPILL PREVENTION AND COUNTERMEASURES



40 CFR 112

PRESENTED BY

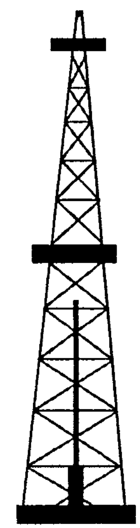
- COMNAVBASE ENVIRONMENTAL
- EFD/EFA

PURPOSE

- TO PREVENT, CONTROL, AND PROVIDE COUNTERMEASURES TO PROHIBIT SPILLS OF OIL CONTAMINATING THE ENVIRONMENT

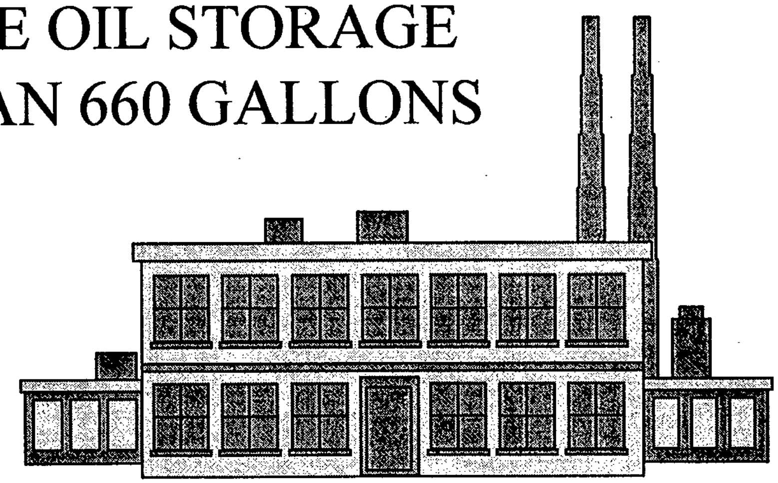
FOCUS ON PREVENTING OIL FROM REACHING NAVIGABLE WATER (CREEKS, ECT)

DOES NOT DIRECTLY APPLY TO HAZARDOUS SUBSTANCES



APPLICATIONS

- FACILITIES WITH MORE THAN 42,000 GALLONS OF UNDERGROUND OIL STORAGE; OR
- FACILITIES WITH MORE THAN 1,320 GALLONS OF ABOVEGROUND OIL STORAGE; OR
- FACILITIES WITH A SINGLE OIL STORAGE CONTAINER OF MORE THAN 660 GALLONS



SET-UP OF REGULATIONS

IF REGS APPLICABLE; FACILITY MUST DEVELOP SPCC PLAN THAT MEETS CERTAIN GUIDELINES, INCLUDING GOOD ENGINEERING PRACTICE

PLAN SHOULD HAVE 3 PARTS;

- INDIVIDUAL FACILITY DESCRIPTIONS/ DEFICIENCIES
- OPERATIONAL REQUIREMENTS TO MAINTAIN SPILL PREVENTION FACILITIES AND DETECT SPILLS
- SPILL RESPONSE PLANS

FACILTIY DESCRIPTIONS

- WHAT DOES THE FACILITY STORE?
- HOW MUCH?
- WHAT TYPE OF CONTAINERS?
- IS SPILL PREVENTION EQUIPMENT IN PLACE?
- TAKE NOTICE OF:
  - CONTAINMENT
  - HIGH LEVEL ALARMS
  - CORROSION PROTECTIONS
  - LOCKS ON "HIGH RISK" VALVES
  - SECURITY (VANDALISM)

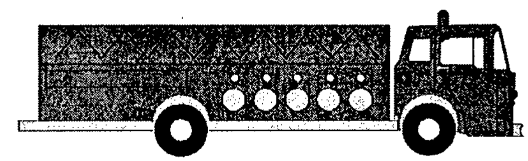
OPERATIONAL REQUIREMENTS

- PROCEDURES FOR OIL TRANSFER OPERATIONS
- PERIODIC INSPECTIONS TO MAKE SURE SPILL PREVENTION EQUIPMENT IS WORKING
- DETECT SPILLS

SPILL RESPONSE

WHO GETS THE CALL?
(notification)

WHO RESPONDS?



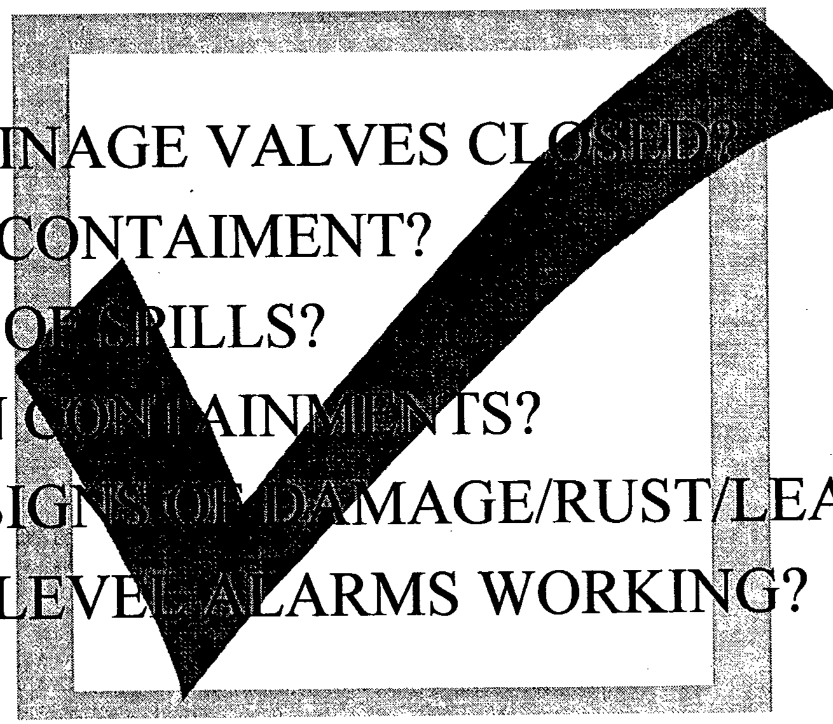
WHAT IS DONE WITH
SPILLED MATERIAL?

CONSULT YOUR SPILL REPORTING PROCEDURE

NEED TO INSPECT

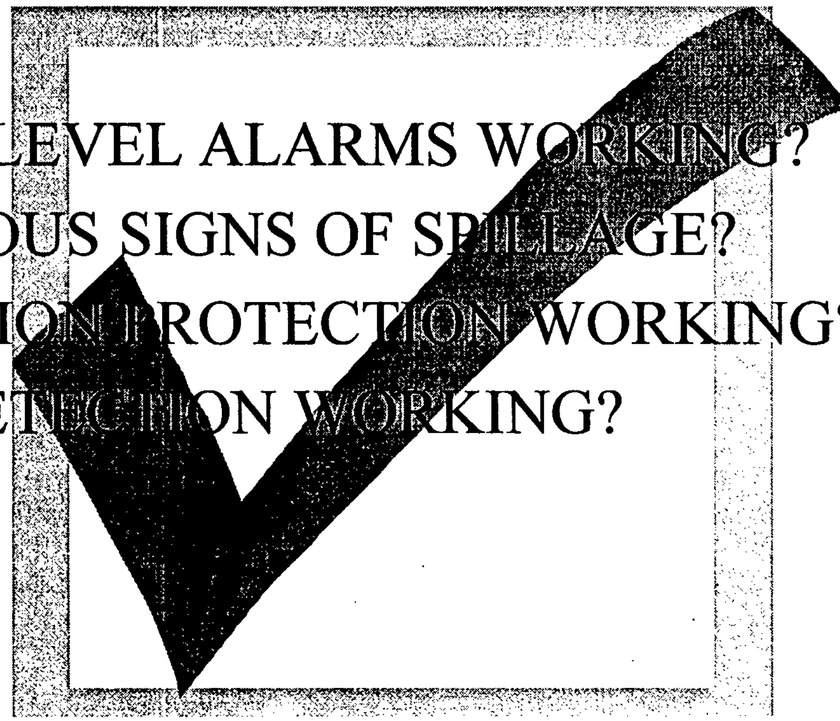
- OIL STORAGE TANKS
- OVERFILL PROTECTIONS SYTEMS
- SPILL CONTAINMENT SYSTEMS
- OIL LOADING/UNLOADING AREAS
- DRUM STORAGE AREAS

INSPECTION DETAILS
(Aboveground tanks and/or piping)



- TANK/DRAINAGE VALVES CLOSED?
- WATER IN CONTAIMENT?
- EVIDENCE OF SPILLS?
- CRACKS IN CONTAINMENTS?
- OBVIOUS SIGNS OF DAMAGE/RUST/LEAKAGE?
- ARE HIGH LEVEL ALARMS WORKING?

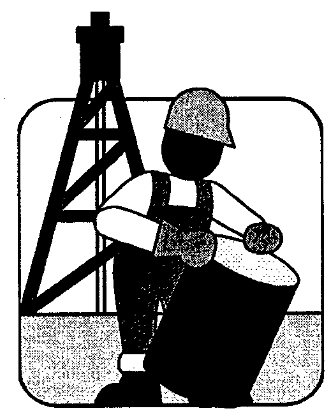
INSPECTION DETAILS
(Underground tanks and/or piping)



- ARE HIGH LEVEL ALARMS WORKING?
- ANY OBVIOUS SIGNS OF SPILLAGE?
- IS CORROSION PROTECTION WORKING?
- IS LEAK DETECTION WORKING?

DRUM STORAGE AREAS

- ARE DRUMS STORED IN CONTAINMENT?
- IS CONTAINMENT DRAINAGE LOCKED?
- IS WATER PRESENT IN CONTAINMENT?
- IS TRASH PRESENT IS CONTAINMENT?
- ARE VALVES TO DRUM LOCKED?



ANATOMY OF A SPILL

NEW YORK HARBOR: BETWEEN ‘87 AND ‘91, 2M GALLONS OF OIL SPILLED

7.9% CAME FORM SHORESIDE HANDLING FACILITIES

- ONE-THIRD OF ALL SPILLS ARE A RESULT OF HUMAN ERROR
- ONE-FOURTH WERE THE RESULT OF EQUIPMENT FAILURE (MAINLY HLAs)
- ONE-SIXTH WERE THE RESULT OF STRUCTURAL FAILURE

TANK COORDINATOR RESPONSIBILIITES

- MAINTAIN STORAGE TANK OPERATING FILE
- INCLUDE SPILL RESPORTS, INSPECTIONS, BASE ORDER, TANK DIAGRAM, AND SPILL REPORTING PROCEDURE
- ALSO CAN INCLUDE WATER INSPECTION PROCEDURES, AND FUELS DEPARTMENT CONTACTS
- NOTIFICATION OF INSTALLATION OF TEMPORARY OR TAFDS REFUELING SYSTEMS
- COMPLETE INSPECTIONS

CNB RESPONSIBILITES

- COMNAVBASE STORAGE TANK MANAGER
- CALL CNB MANAGER WITH QUESTIONS
- INSPECT UNITS/TENANT COMMANDS
- LIASON TO REGULATORS
- NOTIFICATION TO REGULATORS IN CASE OF SPILLS
- PROVIDE TRAINING/ASSISTANCE TO UNITS

IN CASE OF A SPILL

- FIRE DEPARTMEN (PHONE NUMBER)
- COMNAVBASE DUTY OFFICER (PHONE NUMBER)
- REPORT SPILL TO ENVIRONMENTAL (PHONE NUMBER)
- CONTAIN THEN CALL
- FILL OUT SPILL REPORT
- DO NOT, IF POSSIBLE, LET SPILL ENTER DRAIN, DITCHES, OR STANDING WATER (STREAMS, ETC.)